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Sessional papers.

SESSIONAL PAPERS.

VOL XLII.—PART VIII.

SECOND SESSION

OF THE

TWELFTH LEGISLATURE

OF THE

PROVINCE OF ONTARIO.

SESSION 1910.

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LIST OF SESSIONAL PAPERS

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TITLE.	NO.	REMARKS.
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Agricultural Societies, Report	43	"
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Bee-Keepers, Report	37	*Printed.*
Binding and Printing, Contract	53	"
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Births, Marriages and Deaths, Report	19	"
Blind Institute, Report—part of	16	"
Canadian Northern Railway in Clay Belt of Northern Ontario	73	*Not Printed.*
Children Neglected and Dependent, Report	26	*Printed.*
Colonization, Report of Bureau	74	"
Colonization Roads, amount paid for inspection	70	*Not Printed.*
Corn Growers', Report	35	*Printed.*
Dairymen's Association, Report	38	*Printed.*
Division Courts' Inspection, Report	5	"
Drainage, Money Loaned for	71	*Not Printed.*
Education, Report	16	*Printed.*
Education, Orders in Council	56	*Not Printed.*
Education, County Model School Certificates Granted to Teachers	67	"
Education, Permits and Extensions Granted	72	"
Elections, Return from Records	50	*Printed.*
Emigrants brought by Salvation Army	78	*Not Printed.*
Entomological Society, Report	36	*Printed.*
Estimates, 1910-1911	2	"
Factories, Report	46	*Printed.*
Farmers' Institutes, Report	40	"
Feeble-Minded, Report on the	23	"
Fiat, Cases where necessary	77	*Not Printed.*
Fishermen, Licenses Granted to, in Lake Huron and elsewhere	62	"
Fisheries and Game, Report	13	*Printed.*
Fruit Branch, Report	33	"
Fruit Growers', Report	32	"
Game and Fish, Report	13	*Printed.*
Gaols and Prisons, Report	25	"
Gillies' Limit, Area of, etc.	48	*Not Printed.*

TITLE.	NO.	REMARKS.
Hand, Game Warden, Resignation of, etc.	76	*Not Printed.*
Health, Report	20	*Printed.*
Highway Improvement, Report	14	"
Horticultural Societies', Report	44	"
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Hospitals for Idiots and Epileptics, Report	22	"
Hospitals for Insane, Report	21	"
Hydro-Electric Power Commission, Award of Arbitrators *re* Easements	69	*Not Printed.*
Idiots and Epileptics, Hospital, Report	22	*Printed.*
Industries, Report	45	"
Infant Mortality, Report on	66	"
Insane, Hospitals for, Report	21	"
Insurance, Report	10	"
Insurance, Permits to Effect, in Foreign Unregistered Corporations	58	*Not Printed.*
Labour, Report	15	*Printed.*
Lands, Forests and Mines, Report	3	"
Land Titles Act, Orders in Council	59	*Not Printed.*
Legal Offices Inspection, Report	6	*Printed.*
Library, Report on State of	52	"
Liquor License Act, Operation of, Report	27	"
Live Stock Associations, Report	39	"
Loan Corporations, Report	11	"
Milk Commission, Report	55	*Printed.*
Mines, Bureau of, Report	4	"
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Ontario Railway and Municipal Board, Report	49	*Printed.*
Ontario Readers, Tenders for Printing	65	*Not Printed.*
Ontario Veterinary College, Report	30	*Printed.*
Parliament Buildings, Reports *re* Fire at	68	*Not Printed.*
Poultry Institute, Report	42	*Printed.*
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Railway and Municipal Board, Report	49	*Printed.*
Registrar-General, Report	19	"
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Teachers' Certificates	67	*Not Printed.*
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Vegetable Growers' Association, Report	34	*Printed.*
Veterinary College, Report	30	"
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LIST OF SESSIONAL PAPERS

Arranged in numerical Order with their Titles at full length; the dates when Ordered and when presented to the Legislature; the name of the Member who moved the same, and whether Ordered to be Printed or not.

CONTENTS OF PART I.

No. 1..... Public Accounts of the Province, for the ten months ending 31st October, 1909. Presented to the Legislature, 27th January, 1910. *Printed.*

No. 2.... Estimates for the service of the Province until the Estimates of the year are finally passed. Presented to the Legislature, 28th January, 1909. *Not Printed.* Supplementary Estimates for the year 1909-10. Presented to the Legislature, 1st and 28th February, 1910. *Printed.* Estimates for the year ending 31st October, 1911. Presented to the Legislature, 7th March, 1910. *Printed.*

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No. 3..... Report of the Minister of Lands, Forests and Mines of the Province for the year 1909. Presented to the Legislature, 14th March, 1910. *Printed.*

No. 4..... Report of the Bureau of Mines, for the year 1909. Presented to the Legislature, 10th March, 1910. *Printed.*

No. 5..... Report of the Inspector of Division Courts, for the year 1909. Presented to the Legislature, 8th February, 1910. *Printed.*

No. 6..... Report of the Inspector of Legal Offices, for the year 1909. Presented to the Legislature, 8th March, 1910. *Printed.*

No. 7..... Report of the Inspector of Registry Offices, for the year 1909. Presented to the Legislature, 8th March, 1910. *Printed.*

No. 8..... Report of the Provincial Municipal Auditor, for the year 1909. Presented to the Legislature, 14th March, 1910. *Printed.*

No. 9.... Report of the Commissioners for the Queen Victoria Niagara Falls Park, for the year 1909. Presented to the Legislature, 4th March, 1910. *Printed.*

CONTENTS OF PART III.

No. 10.... Report of the Inspector of Insurance and Registrar of Friendly Societies for the year 1909. Presented to the Legislature, 18th February, 1910. *Printed.*

No. 11.... Financial Statements made by Loan Corporations, Building Societies, Loaning Land Companies and Trust Companies, for the year 1909. Presented to the Legislature, 18th February, 1910. *Printed.*

CONTENTS OF PART IV.

No. 12.... Report of the Minister of Public Works, for the year 1909. Presented to the Legislature, 14th February, 1910. *Printed.*

No. 13.... Report of the Game and Fisheries Department, for the year 1909. Presented to the Legislature, 18th February, 1910. *Printed.*

No. 14.... Report on Highway Improvement in Ontario, for the year 1909. Presented to the Legislature, 14th February, 1910. *Printed.*

No. 15.... Report of the Bureau of Labour of Ontario, for the year 1909. Presented to the Legislature, 14th March, 1910. *Printed.*

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No. 16.... Report of the Minister of Education, for the year 1909. Presented to the Legislature, 21st February, 1910. *Printed.*

No. 17.... Report of the Board of Governors of the University of Toronto, for the year ending 30th June, 1909. Presented to the Legislature, 27th January, 1910. *Printed.*

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No. 18.... Report of the Secretary and Registrar of Ontario, for the year 1909. Presented to the Legislature, 4th March, 1910. *Printed.*

No. 19.... Report of the Registrar-General, relating to the Registration of Births, Marriages and Deaths, for the year 1908. Presented to the Legislature, 21st February, 1910. *Printed.*

No. 20.... Report of the Provincial Board of Health, for the year 1909. Presented to the Legislature, 21st February, 1910. *Printed.*

No. 21.... Report upon the Hospitals for the Insane of Ontario, for the year ending 30th September, 1909. Presented to the Legislature, 8th March, 1910. *Printed.*

No. 22.... Report upon the Hospital for Idiots and Epileptics, for the year 1909. Presented to the Legislature, 8th March, 1910. *Printed.*

No. 23.... Report upon the Feeble-Minded in Ontario, for the year 1909. Presented to the Legislature, 9th March, 1910. *Printed.*

No. 24.... Report upon the Hospitals and Charities of Ontario, for the year ending 30th September, 1909. Presented to the Legislature, 8th March, 1910. *Printed.*

No. 25.... Report upon the Common Gaols, Prisons, and Reformatories of Ontario, for the year ending 30th September, 1909. Presented to the Legislature, 14th March, 1910. *Printed.*

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No. 26.... Report on Neglected and Dependent Children in Ontario, for the year 1909. Presented to the Legislature, 8th March, 1910. *Printed.*

No. 27.... Report upon the Operation of the Liquor License Acts in Ontario, for the year 1909. Presented to the Legislature, 10th March, 1910. *Printed.*

No. 28.... Report of the Department of Agriculture, for the year 1909. Presented to the Legislature, 14th March, 1910. *Printed.*

No. 29.... Report of the Ontario Agricultural College and Experimental Farm, for the year 1909. Presented to the Legislature, 10th March, 1910. *Printed.*

No. 30.... Report of the Ontario Veterinary College, for the year 1909. Presented to the Legislature, 10th March, 1910. *Printed.*

No. 31.... Report of the Ontario Agricultural and Experimental Union, for the year 1909. Presented to the Legislature, 10th March, 1910. *Printed.*

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No. 32.... Report of the Fruit Growers' Association of Ontario, for the year 1909. Presented to the Legislature, 10th March, 1910. *Printed.*

No. 33.... Report of the Fruit Branch of the Department of Agriculture, for the year 1909. Presented to the Legislature, 10th March, 1910. *Printed.*

No. 34.... Report of the Ontario Vegetable Growers' Association, for the year 1909. Presented to the Legislature, 10th March, 1910. *Printed.*

No. 35.... Report of the Ontario Corn Growers for the year 1909. Presented to the Legislature, 10th March, 1910. *Printed.*

No. 36.... Report of the Entomological Society of Ontario, for the year 1909. Presented to the Legislature, 10th March, 1910. *Printed.*

No. 37.... Report of the Ontario Bee-Keepers' Association, for the year 1909. Presented to the Legislature, 10th March, 1910. *Printed.*

No. 38.... Report of the Dairymen's Associations of Ontario, for the year 1909. Presented to the Legislature, 10th March, 1910. *Printed.*

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No. 39.... Report of the Live Stock Associations of Ontario, for the year 1909. Presented to the Legislature, 4th February, 1910. *Printed.*

No. 40.... Report of the Farmers' Institutes of Ontario, for the year 1909. Presented to the Legislature, 4th February, 1910. *Printed.*

No. 41.... Report of the Women's Institutes of Ontario, for the year 1909. Presented to the Legislature, 4th February, 1910. *Printed.*

No. 42.... Report of the Poultry Institute of the Province of Ontario, for the year 1909. Presented to the Legislature, 4th February, 1910. *Printed.*

No. 43.... Report of the Agricultural Societies of Ontario, for the year 1909. Presented to the Legislature, 4th February, 1910. *Printed.*

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No. 44.... Report of the Horticultural Societies of Ontario, for the year 1909. Presented to the Legislature, 10th March, 1910. *Printed.*

No. 45.... Report of the Bureau of Industries of Ontario, for the year 1909. Presented to the Legislature, 10th March, 1910. *Printed.*

No. 46.... Report of the Inspectors of Factories of Ontario, for the year 1909. Presented to the Legislature, 10th March, 1910. *Printed.*

No. 47.... Report of the Temiskaming and Northern Ontario Railway Commission, for the year 1909. Presented to the Legislature, 27th January, 1910. *Printed.*

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No. 48.... Return to an Order of the House of the Twenty-first day of February, 1910, for a Return shewing: (*a*) What is the area of the Gillies Limit. (*b*) How much of the area has been reported to the Government to be mineralized. (*c*) How much of the area has been prospected. (*d*) How much of the area has been sold. (*e*) What are the dates of the respective sales, the amount sold in each case, the names of the purchasers and the prices obtained in each case. Presented to the Legislature, 9th March, 1910. Mr. *McDougal. Not Printed.*

No. 49.... Report of the Ontario Railway and Municipal Board, for the year 1909. Presented to the Legislature, 1st February, 1910. *Printed.*

No. 50.... A Return from the Records of the General and Subsequent Elections to the Legislative Assembly on the 8th day of June, 1908, shewing:— (1) The number of Votes Polled for each Candidate in each Electoral District in which there was a contest; (2) The majority whereby each successful Candidate was returned; (3) The total number of Votes Polled; (4) The number of Votes remaining unpolled; (5) The number of names on the Polling Lists; (6) The number of Ballot Papers sent out to each Polling Place; (7) The Used Ballot Papers; (8) The Unused Ballot Papers; (9) The Rejected Ballot Papers; (10) The Cancelled Ballot Papers; (11) The Declined Ballot Papers; (12) The Ballot Papers taken from Polling Places; (13) A General Summary of Votes cast in each Electoral District; (14) A similar statement as to any Elections held since the General Election. Presented to the Legislature, 26th January, 1910. *Printed.*

No. 51.... Report upon the Archives of the Province, for the year 1909. Presented to the Legislature, 8th March, 1910. *Printed.*

No. 52.... Report of the Librarian on the state of the Library. Presented to the Legislature, 27th January, 1910. *Printed.*

No. 53.... Agreement and Contract with William Briggs, D.D., Book Steward of the Methodist Church, in connection with the Printing and Binding for the Legislative Assembly of Ontario. Presented to the Legislature, 26th January, 1910. *Printed.*

No. 54.... Agreement and Contract with E. H. Harcourt Company, Limited, in connection with the Binding, etc., for the Legislative Assembly of Ontario. Presented to the Legislature, 26th January, 1910. *Printed.*

No. 55.... Report of the Milk Commission appointed to enquire into the production, care and distribution of Milk. Presented to the Legislature, 21st February, 1910. *Printed*

No. 56.... Copies of Regulations and Orders in Council in the matter of Education, made pursuant to the provisions of 6 Edward VII., Cap. 52, Section 27, since the last Session of the Legislature. Presented to the Legislature, 27th January, 1910. *Not printed.*

No. 57.... Statement of the Auditor made pursuant to the provisions of Section 13, Sub-section 2, of the Audit Act as amended by Section 6, Chapter 10, 9 Edward VII. Presented to the Legislature, 27th January, 1910. *Printed.*

No. 58.... Return to an Order of the House of the Thirtieth day of March, 1909, for a Return shewing, during the past twelve months all permits to effect insurance in foreign unregistered Corporations, Insurers or Underwriters issued by the Insurance Registrar, under Section 86a of the Ontario Insurance Act, as amended by 2 Edward VII., Cap. 12, and 4 Edward VII., Cap. 15, and of all letters and applications in respect of which such permits were issued. Presented to the Legislature, 27th January, 1910. Mr. *Proudfoot. Not printed.*

No. 59.... Copies of Orders in Council in accordance with the provisions of Subsection 2 of Section 84 of the Surrogate Courts Acts, and Subsection 4 of Section 164 of the Land Titles Act. Presented to the Legislature, 3rd February, 1910. *Not printed.*

No. 60.... The Province of Ontario, Situation and Size, Climate, Products, Resources, Progress and Advantages. Presented to the Legislature, 4th February, 1910. *Printed for distribution only.*

No. 61.... Copy of an Order in Council under Sub-section 2 of Section 84 of the Surrogate Courts Act, authorizing payment of surplus surrogate fees to His Honour Judge Wismer, Junior Judge of the County Court of the County of Simcoe. Presented to the Legislature, 7th February, 1910. *Not printed.*

No. 62.... Return to an Order of the House of the Twenty-eighth day of January, 1910, for a Return: 1. Shewing the number of Licenses Granted to Fishermen in each of the following Districts in the years 1908 and 1909; (*a*) Lake Superior. (*b*) The Northern Channel of Lake Huron. (*c*) Georgian Bay. (*d*) Lake Huron and Lake St. Clair. (*e*) Lake Erie and Grand River. (*f*) Rivers St. Clair, Thames

of such receipts given and to whom, together with copies of all correspondence covering the matters referred to in this clause. 3. All correspondence in connection with the resignation of the said Hand. 4. All moneys collected by the said Hand during the years 1907 and 1908 and of all moneys collected by the present officer, A. Calbeck, during the year 1909, together with the names of the persons from whom the said collections were made. Presented to the Legislature, 15th March, 1910. Mr. *Proudfoot*. *Not printed.*

No. 77.... Return to an Order of the House of the Thirtieth day of March, 1909, for a Return shewing: 1. How often had the present Government been asked for permission to institute an action in cases where a fiat was necessary. 2. How often had such permission been granted. 3. In what cases. 4. How often was such permission refused. 5. In what cases. Presented to the Legislature, 15th March, 1910. Mr. *Elliott*. *Not printed.*

No. 78.... Return to an Order of the House of the Twenty-fifth of February, 1910, for a Return shewing: 1. How many Emigrants the Salvation Army brought out from Great Britain and Ireland during the season 1909. How many were male and how many female. 3. How many were placed in the homes of the farmers of the Province of Ontario. 4. The names and addresses of the farmers. Also shewing: 1. How many Emigrants the Government of this Province brought out from Great Britain and Ireland during the season of 1909. 2. How many male and how many female. 3. How many were placed in the homes of the farmers of the Province of Ontario. 4. The names and addresses of the farmers. Presented to the Legislature, 16th March, 1910. Mr. *Studholme*. *Not printed.*

Forty-first Annual Report

OF THE

Fruit Growers' Association

OF

ONTARIO

1909

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
Printed by L. K. CAMERON, Printer to the King's Most Excellent Majesty
1910

Printed by
WILLIAM BRIGGS,
29-37 Richmond Street West,
TORONTO

To the Honourable JOHN MORISON GIBSON, K.C., LL.D., etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the honour to present the Forty-first Annual Report of the Fruit Growers' Association of Ontario.

Respectfully submitted,

JAMES S. DUFF,

Minister of Agriculture.

DEPARTMENT OF AGRICULTURE,

TORONTO, 1910.

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Fruit Growers' Association of Ontario.

OFFICERS FOR 1910:

President ..... JAS. E. JOHNSON, Simcoe.
Vice-President ..... R. W. GRIERSON, Oshawa.
Secretary-Treasurer ..... P. W. HODGETTS, Parliament Buildings, Toronto.

DIRECTORS:

Division No. 1.—R. B. WHYTE, Ottawa.
" 2.—HAROLD JONES, Maitland.
" 3.—F. S. WALLBRIDGE, Belleville.
" 4—W. H. GIBSON, Newcastle.
" 5.—R. W. GRIERSON, Oshawa.
" 6.—L. A. HAMILTON, Lorne Park.
" 7.—E. D. SMITH, Winona.
" 8.—A. ONSLOW, Niagara-on-the-Lake.
" 9.—J. E. JOHNSON, Simcoe.
" 10.—J. L. HILBORN, Leamington.
" 11.—F. METCALF, Blyth.
" 12.—C. W. GURNEY, Paris.
" 13.—ADAM BROWN, Owen Sound.

Ontario Agricultural College: Prof. H. L. HUTT, Guelph.
Honorary Directors: THOS. BEALL, Lindsay; A. M. SMITH, St. Catharines; W. T. MACOUN, Ottawa.
Auditor: W. G. LINDSAY, Department of Agriculture, Toronto.

REPRESENTATIVES TO FAIR BOARDS AND CONVENTIONS:

London: D. JOHNSON, Forest; C. W. GURNEY, Paris.
Ottawa: R. B. WHYTE, Ottawa; HAROLD JONES, Maitland.
Toronto: W. H. BUNTING, St. Catharines; P. W. HODGETTS, Toronto.
Ontario Horticultural Exhibition: W. H. BUNTING, St. Catharines; JAS. E. JOHNSON, Simcoe; E. LICK, Oshawa; P. W. HODGETTS, Toronto.

COMMITTEES:

Executive: President, Vice-President and Secretary, with C. W. GURNEY, Paris, and F. S. WALLBRIDGE, Belleville.

Transportation: W. H. BUNTING, St. Catharines; L. A. HAMILTON, Lorne Park; R. W. GRIERSON, Oshawa; E. D. SMITH, Winona; R. J. GRAHAM, Belleville; WM. RANDALL, Grimsby; J. L. HILBORN, Leamington; J. E. JOHNSON, Simcoe, and the Secretary.

Co-operation: JAS. E. JOHNSON, Simcoe; ELMER LICK, Oshawa; ROBT. THOMPSON, St. Catharines; ADAM BROWN, Owen Sound, and D. JOHNSON, Forest.

New Fruits: Prof. H. L. HUTT, Guelph; W. T. MACOUN, Ottawa; J. W. CROW, Guelph; and H. S. PEART, Jordan Harbor.

Historical: A. MCNEILL, Ottawa; L. WOOLVERTON, Grimsby; HAROLD JONES, Maitland; W. T. MACOUN, Ottawa; W. DEMPSEY, Trenton; A. M. SMITH, Pt. Dalhousie.

Judging Scales: W. T. MACOUN, Ottawa; Prof. H. L. HUTT, Guelph; A. E. SHERRINGTON, Walkerton; W. H. DEMPSEY, Trenton; H. S. PEART, Jordan Harbor.

FINANCIAL STATEMENT, 1909.

Receipts.

Balance on hand, Dec. 31, 1908.		$1,690 63
Members' fees		237 60
Fruit Show:		
Sale of fruit	1,254 95	
Entry fees	151 77	
Legislative grant	1,425 00	
Interest	39 72	
		$4,799 67

Expenditures.

Fruit Show:		
Cash paid for special prizes	$431 16	
Cash paid to exhibitors for fruit	922 15	
Labor	209 65	
Transportation, storage, etc., of exhibits	225 64	
Judges' expenses	20 00	
Printing	21 00	
Incidentals	23 55	
Annual Meeting:		
Lecturers' expenses	143 19	
Delegates' expenses	86 40	
Advertising	30 75	
Printing	32 75	
Rent of hall, etc.	33 00	
Periodicals for members		311 80
Stock subscriptions, Horticultural Publishing Co.		200 00
Postage		97 00
Printing "Success in Apple Growing"		116 40
Pomological Committee:		
Travelling expenses	64 10	
Exhibits	28 24	
Transportation Committee:		
Travelling expenses	122 93	
Transcript proceedings of R. R. Commission	10 00	
Co-operative Committee:		
Travelling expenses	51 55	
Printing	12 50	
Directors' travelling expenses		90 50
Horticultural Exhibition:		
Committee travelling expenses	26 50	
Incidentals	77 84	
Balance on hand, Dec. 31, 1909.		1,411 07
		$4,799 67

Examined and found correct this 10th day of January, 1910.

W. G. LINDSAY,

(Signed) E. D. SMITH,
President.

P. W. HODGETTS,
Treasurer.

Fruit Growers' Association of Ontario

ANNUAL MEETING.

The fiftieth annual meeting of the Fruit Growers' Association of Ontario was held in the Temple Building, Toronto, on the 10th and 11th of November, 1909.

Mr. E. D. Smith, the President, called the meeting to order at 10 a.m., Wednesday, November 10th.

PRESIDENT'S ADDRESS.

By E. D. Smith, Winona.

Fifty years have passed away since the charter members subscribed at Hamilton, Ontario, forming the beginning of the Ontario Fruit Growers' Association, that has been in active force in Ontario since that date.

It will be well at this time to take a retrospective glance at the progress made during the last fifty years in Horticulture in Ontario, and, at the same time, see if the lessons learned in that fifty years may enable us to improve and make more profitable our calling in the future.

There are a number of papers to be read at this meeting, looking back fifty years, in regard to special lines of fruit-growing. I would not be able to touch upon the ground occupied by these papers if I felt inclined, as my experience does not reach so far and our provincial statistics do not give us very much information at that very early date. However, remembering back for thirty-five years I know that the progress has been most wonderful in the acreage of the various fruits. During that time we have seen most, if not all, of the canning factories and jam factories established in Ontario. All of the tender fruit-growing industries have practically been established within fifty years and have grown to the very considerable proportions that we know they have reached to-day. It is true there were at that time a considerable number of apple orchards, but they were of small dimensions individually and it has only been of late years that orchardists have gone into the growing of apples on an extensive scale, directly for commercial purposes.

According to the Blue Books, we have at present growing in Ontario over 7,000,000 apple trees in bearing; 14,000 acres of vineyards; 350,000 acres of orchard and garden.

As fruit-growing increased in area and importance, difficulties began to crop up and it has been one of the functions of this Association to endeavor to educate the fruit-growers how to overcome these difficulties. Some of them have required legislative remedies; others physical remedies. We have gone on step by step suggesting as far as possible laws to improve the conditions of the industry. We have not always been able to get all we have wanted, sometimes, because we have not been very unanimous, but we have been able to secure many important laws and regulations that have enabled us to pursue our calling more profitably. The Black Knot and the Yellows Acts were both, I believe, suggested by this Association, and have

proven to be of inestimable value. The underlying principle of these, as well as some succeeding Acts, has been throwing upon the municipalities the onus of bringing these Acts into operation on the petition of a limited number of residents of the municipality. This relieved the Provincial Government from responsibility and throws the responsibility entirely upon the municipality. This, I consider only a partial remedy for very contagious diseases. It does not fully answer the purpose because the boundaries of these townships may be infested from adjoining townships where the Act has not been put in force. Still it was a step, and a very important one, in the right direction. It has enabled us to fairly well control most of the diseases covered by these special laws. In some cases, however, where not backed up by unanimous public opinion, they have fallen by the wayside. For instance, the Act regarding the bandaging of apple trees and the killing of the Codling Moth. Saltfleet tried this. I am not sure whether any other township tried it or not, but, owing to lack of interest on the part of considerable numbers of people interested, the Act was allowed to fall into disuse.

It seems to me that the time has come when it is opportune to discuss the advisability of having similar laws carried out throughout the whole Province under the supervision of Ontario authorities. There was a good reason in the earliest days why this should not be done: It had not yet become absolutely certain, or at any rate a large portion of the fruit-growers had not become convinced, what were effective remedies. For instance, many contended that spraying was a wasteful extravagance. Many would point to orchards where they had just as good fruit year after year on unsprayed trees as those that were sprayed, and so long as a large number, perhaps a majority, were not absolutely convinced, it would have been difficult to persuade the provincial authorities of the necessity of enforcing spraying. The same is true in regard to San José Scale, Black Knot and Yellows, and others. But owing to the wide dissemination of information through government agencies, such as Farmers' Institutes and Fruit Institutes and through discussions in the Fruit-Growing Societies and through the horticultural press, I believe, at the present time, the vast majority of fruit-growers have come to fully realize the absolute necessity of thoroughness in caring for their orchards, not only in cultivation and fertilizing, but in the combating of noxious diseases and pests.

We cannot expect assured success except by united action, and the greater the sphere of united action the more effective will be the result. If the sphere of action is limited to a township, there certainly will be portions of it that will not receive the benefit from the measures that are being used. Consequently, it must follow that, to have a really efficient control over these enemies, we must have a wider field wherein prohibitive or destructive measures are employed, and it seems to me that it is a function of this Association, being the parent society in Ontario, to thoroughly discuss at an early date the advisability of asking the Ontario Government to put in force, over the whole of the Province, legislation that will stamp out or keep in subjection the most prevalent contagious diseases and pests.

We have in Ontario 7,000,000 bearing apple trees. In a favorable season these trees ought to bear at least one barrel per tree of packed apples No. 1 or No. 2. That is an extremely modest estimate. I do not believe, at the present time, we are securing one barrel more than half of this. We have no statistics to know exactly how many apples are packed and shipped. We are able to tell how many are shipped abroad, but we are not able to know how many are used up in the Dominion of Canada; and so what I have said is only an estimate. Why then are we not packing a barrel to a tree? Everybody in the apple business knows that,

on an average over this country, not more than half of the apples grown upon the trees are either fit for No. 1 or No. 2. In fact, I believe if the apples were packed in strict compliance with the Act, not over one-third of the apples grown in Ontario would be packed this year. The cause of this enormous waste and loss as everyone knows is twofold; first, chiefly, the fungus; secondly, the Codling Moth. Now there are orchardists who know that both of these can be absolutely controlled in the worst sections of the country. Hundreds of apple men will admit that the fungus can be controlled by spraying, and I think no one will doubt that the Codling Moth can be controlled if there was a universal law fully enforced compelling everyone to use every effort to destroy the Codling Moth either by bandaging or spraying.

Several of the Western States, and, in our own Dominion, the Province of British Columbia, have laws much more strict in regard to fruit-growing than any that have been suggested in Ontario, and fruit growing in these localities has become one of their staple industries. They pride themselves on it. They laugh at our packing, and although our packing has improved rapidly of late years, still the vast majority of it is not what it ought to be. We must start at the beginning and enforce the production only of good fruit. With thorough spraying we can grow the finest Spys in the world, and the Spy is, taken all round, perhaps the most valuable apple in the world,—at any rate, that grown in Ontario. There is no country that can beat us growing Baldwins. It seems to me that, in those parts of Ontario where these apples thrive, a national specialty ought to be made of them. The ordinary fruit-grower or farmer or packer can scarcely realize what might be made out of these fruits when properly grown. There is no difficulty in getting 50c. per barrel more for well-grown and well-colored fruit than for that which passes as the same grade, but merely passes.

The great future possibility of apple growing in Ontario lies in producing perfect specimens of good varieties of apples. We have the soil and the climate to do it. All we need is united action in combating diseases and we can only get united action by provincial authority.

As an instance of the result of thoroughness, this season Mr. Joseph Tweddle, of Fruitland, grew and packed upon twelve acres of Spy orchard over 3,200 barrels of apples, the great majorjty of which were No. 1, and he was obliged to throw out not more than 4 per cent. of the total production of the trees on account of Codling Moth; whereas, in other orchards not so thorougly sprayed, a large portion of the crop, in some cases one-third of it, even in well-sprayed orchards, had to be thrown out on account of the ravages of the Codling Moth. These apples at the modest price of $3 per barrel for such choice stock brought a gross return of $800 per acre from land that is worth only $100 per acre, in the Township of Binbrook, where they were grown.

I know of no kind of fruit-growing anywhere in Canada that will produce greater returns than this, except in very special cases indeed. I have seen crops of plums, peaches and blackberries bring considerably more money, but it happened to be a happy combination of a big crop with big prices. Now, Mr. Tweddle's crop was undoubtedly a big one, but the price can be maintained for Spys nine years out of ten of the grade and quality that these were. I think the farmers of Southern Ontario are missing their opportunity when they do not take the most up-to-date care of an orchard of any kind of our good winter apples. I say Southern Ontario, —I might say all Ontario; possibly more care is required in Southern Ontario, as the Codling Moth is a more destructive pest than in the northern part. If our people become thoroughly aroused to the value of their location for growing apples under

skilful management, Ontario will very soon stand at the front, not only of the Provinces of the Dominion, but of this Continent, in the very profitable production of a high quality of apples.

If there is one thing more than another I have noted that we are deficient in and which we have not provided for, it is not having in Ontario skilful apple packers. Few people realize what an army of men go into the orchards each autumn to pack the product of Ontario orchards. I have no means of getting at exact numbers. Each autumn 10,000, and more, of our young men go to the West to help harvest the crops there. I believe there are at least as many occupied in packing apples in the fall. At any rate it is a goodly army and most of them are untrained or badly trained. Of this army of men, how many can tell with certainty twenty varieties of apples one from the other? How many can define exactly what a real No. 1 apple should be? How many can distinguish the line between a No. 2 apple and a No. 3 with any degree of accuracy? My experience is that the number is exceedingly small that are really efficient.

Now how are we going to remedy this? The Fruit Marks Act originated by this Association has been the means of improving to a considerable extent the apple-packing, and this year the packing of other fruits as well in Ontario, but it has failed to perform all that was expected of it, and it has failed to perform nearly all that it is capable of doing, for the simple reason that there are so few skilled men. The inspectors themselves in some cases are not properly skilled men. The opinions of two inspectors will not tally. The apples that will pass one inspector will not pass another.

When the ladies of Ontario made up their minds they wanted domestic science taught in the schools, they found the Government quite willing to adopt their suggestions, but they discovered immediately that there were no teachers. So, before domestic science could be inaugurated in the school, a school to teach teachers had to be organized and Sir William MacDonald and Professor Robertson stepped into the breach, and the one organized and the other provided the means to organize schools for that purpose. What we want in Ontario is a school to teach apple-packers how to pack apples. Some little has been done in this connection through demonstrations at Fall Exhibitions, but I can readily see that at that busy time few of the young men who are really in need of this education are able to take advantage of it, besides it is limited in scope and in time.

It seems to me the apple industry in Ontario is of such importance as to warrant the Government in spending a moderate sum of money in engaging teachers who might travel about from one part of Ontario to another in the winter time and provide a short course of say two weeks in the training of those who wish to learn how to properly grade apples and how to know the leading varieties, at any rate, by sight. Even a five days' course would be of inestimable value. It would not cost the Government a great deal to get a sufficient number of instructors for this. Commencing the first of December and ending the first of April, eight courses might be got in of two weeks each by each instructor. I know there are some who have a hobby that co-operative societies are going to cure all the troubles. Under certain circumstances co-operative societies may be of great benefit, but I see no reason why an individual may not do what a co-operative society can do. I know of at least two individuals who are doing as good, if not better work, than any co-operative society that I know of, and I have no doubt there are many others in the Province. The whole thing depends upon the man at the head.

If a co-operative society gets as its manager a strong, able man, that society will probably succeed, but that same able man could carry on a private business in

exactly the same way and achieve exactly the same results. The difficulty is not so much with the system in vogue in Ontario as it is with the men engaged in it. The leading dealers find themselves handicapped by being unable to get sufficient help, trained help, and still worse handicapped by having to put up in most cases, apples that have been unsprayed or uncared for. Consequently, in bad years the greater portion of them are really only fit for No. 2 or No. 3. So that, summing up the apple situation for the future and taking advantage of the lessons of the past, my suggestion is that the greatest improvement can be made by pressing forward to obtain two things: First, compulsory care of orchards in respect to contagious diseases and insects that spread rapidly; and, secondly, in the training of young men in the proper art of packing and naming apples.

There is scarcely any limit to the possibility of apple growing in Ontario. There are hundreds of thousands of acres of the choicest apple growing land in the world still untouched. Our markets are expanding and will expand more rapidly in the future if we put up only a high grade of apples. We have never had a year when a very high grade of apples did not bring a profitable price in the British market. Our own market, West, is growing rapidly and will absorb enormous quantities of high grade apples. They are willing to pay an extra price for a good grade of apples. Even the United States market will frequently take large quantities of high grade apples, especially Spys.

We are importing each year into Canada approximately $75,000 worth of apples. A large part of these are early apples, which might be grown in the southern part of the Province; I believe some of our best early apples would return anybody good money, planted in the earliest parts of the Province. I believe an orchard of Wealthies in the southern part of the Province would pay anybody good money, and it is not the earliest apple by any means. The North-west consumes large quantities of apples as early as they are to be had regardless of price. At present we are bringing in too many from across the border.

I wish to take this opportunity of saying that, finally, the Dominion Government have placed inspectors in the tender fruit belt at the solicitation of this Association and others, and that these inspectors have been of great value to us during the past season. We, in the Niagara district, would like to see more of them. They have been the means of checking to some extent the fraudulent and careless packing of some of the tender fruits.

The remarks that I have made in regard to compulsory care of apple orchards applies equally to peaches, plums, cherries, grapes and other fruits. Almost every fruit we grow has some enemy that is spread by means of the wind, or the birds, or some other agency, from one farm to another and from one locality to another, and no matter how carefully and thoroughly one man or even one township applies the remedy for these respective enemies, they cannot expect to be altogether successful when incursions of these enemies are liable to occur from a neighboring farm or township at any time. One of the most serious of these raiding pests is the San José Scale.

It is true that in some parts of the Niagara district the laws are well enforced and the scale is kept in subjection. In my own township there is very little scale, because we have insisted upon thorough inspection and thorough spraying or eradication of the insect through the offices of the inspector. Still it is almost impossible to entirely eradicate the San José Scale unless the whole Province acts as a unit. A bird may light on a tree infested by San José Scale in a fruit-grower's orchard, fly half a mile and light on another orchard and deposit one scale. That is enough

to start a colony, and in a short time it is spread over a large section and the fruit-grower finds he has an infested orchard.

The Mildew of the grapes, the Black Rot of the grapes, the Yellows in peaches and the Black Knot in plums and cherries, and the Blight in pears are all propagated by spores carried by the wind, birds or insects. From all such enemies and diseases a fruit-grower is entitled to protection by the State, in my humble judgment. There is a common law of the country under which no man is bound to submit to a nuisance perpetrated by another; the Government steps in and sees the man committing the nuisance, and says, "You must not do this; you must not create a nuisance for your neighbor." But this is exactly what the fruit-grower is doing who propagates scale, fungus or other diseases that are carried by the wind or by natural agencies, such as birds, to his neighbors' orchards.

After having grown fruit successfully, however, the battle is only half won. The marketing of the crop is a matter of almost equal importance to the growing of it. The marketing of the crops of peaches, plums, pears and grapes and other tender fruits is approaching rapidly as near perfection as one can expect for perishable products, and the methods of the marketing of apples have improved considerably of late.

Twenty-five years ago almost the entire product of the Niagara district was sold through commission agents in the large cities. These gentlemen, after paying the freight or express charges and deducting from the proceeds what they considered reasonable remuneration for their services, returned the balance, if any to the grower. This system of marketing was far from satisfactory. To-day, however, nearly all the product is sold directly to the trade throughout the Dominion without the intercession of the commission man, thereby giving the producer an opportunity of exercising his own judgment as to the price he will take and the market he will sell in. To such an extent has this reached that the men who were formerly commission men entirely, have now become purchasers to a very large extent, and it only requires the unanimous support of all growers to stop entirely the pernicious system of sending the bulk of the crop to be sold by commission merchants. I do not for one moment say that commission merchants are not necessary; there are times when some outlet for surplus products must be found. There is then sometimes no other means except sending the goods to a broker to be sold for what they will bring. But this system should be resorted to in as few cases as possible.

The same condition existed in regard to our apples a few years back and does to a large extent to-day, but each year sees larger numbers of buyers in the field, so that to-day no one who has apples packed in a real first-class manner that can be depended upon, need take any chances on a commission market. The only reason why every apple in Ontario is not bought direct at a price to be agreed upon between buyer and seller is because a large number of the packs cannot be depended upon for the quality. It should be the aim of this Association, in the future as in the past, to do everything in its power to raise the standard of quality. Honest packing and good quality are the foundation stones of success.

It would be an ideal condition in apple packing if a merchant in England or any distant place could be sure when he bought a parcel of apples as No. 1 that they would come up to a given standard, a uniform standard. There would be no difficulty in finding a market for every barrel of apples packed in Ontario at the shipping point at a highly remunerative price if that were the case.

During the past fifty years there has been a gradual improvement of varieties, especially of the tender fruits. I do not think our knowledge of varieties is at all

what it ought to be. I hope for good results in this direction from the new Experimental Farm at Jordan, but these results naturally will be brought about only after the lapse of considerable time.

We require a pear of good quality that will not blight. We require peaches and plums of good quality that will ship to distant markets, as the greatest market for all our fruits is coming to be more and more our own North-west Provinces, and to reach these with our tender fruits in good condition requires good fruit of good shipping qualities. Sufficient attention has not been paid to this in the past and our knowledge along this line is limited. Our climate in Ontario is such as to produce juicy, rich, delicious fruits. These naturally are not good carriers. We have to compete in the markets of the North-west with the products of the irrigated orchards of California and British Columbia where these fruits grown in a rainless atmosphere are dry and have on them no germs of rot when they start out on their journey. Consequently, it seems to me that one of the main purposes of experimentation in the future should be to introduce fruits that will carry well to these markets to compete there on favorable terms with the products of the Pacific slope.

Experiments have been made during the past season in shipping our peaches to the British market with great success. I think there is no reason why Elberta peaches should not be laid down in the British markets in perfect condition, shipped by express to Quebec, thence in cold storage on boats that only require five to six days to land them in those markets. I say Elberta, because it is a peach which possesses better carrying qualities than any other we have. We require an Elberta all along the season of peaches, or better still an improvement on the Elberta in quality; but I cannot agree with the gentleman who ranks the Elberta amongst peaches, along with the Ben Davis amongst apples, and the Kieffer amongst pears. I think it takes a higher rank than these.

Ontario was honored during the past autumn by the American Pomological Society holding its annual meeting in the city of St. Catharines. The visitors, some 300 in number, were taken for an excursion through the Grimsby and Winona district one day, another day through the Niagara district, and as many of them as chose to go for a trip to the Agricultural College and Farm at Guelph. The date of the meeting at St. Catharines was fortunate in respect of showing our visitors our peach orchards at their best, but unfortunate in that fruit growers were too busy to attend the meetings, as a rule. Hence, the local attendance was very limited at the Pomological Society meetings at which many most interesting papers were read and discussions held. Our visitors expressed themselves as highly pleased with their visit, and made many complimentary remarks as to the position of the fruit-growing industry in the Niagara district.

I wish to take this opportunity of complimenting the two greatest railway companies in the country, the Grand Trunk and the Canadian Pacific, on the improved freight service for fruit to the North-west. Some two or three years ago the Grand Trunk inaugurated a through service to Winnipeg of five days and a half, which was a vast improvement on the time taken by the route of the Grand Trunk and North Bay thence C.P.R. to Winnipeg, this latter route usually taking eight or nine days. However, during the past season, both roads, the Grand Trunk *via* Grand Haven and Milwaukee, and the C.P.R. by their new line *via* Sudbury, have given us a service of four days and a half to Winnipeg. This, I consider a very fair time, but only what we ought to have had years ago.

As I pointed out in a discussion upon this question in the House of Commons, some five cars were taken from St. Catharines to Winnipeg by North Bay, four out of the five going through in less than five and a half days, because there was a fruit grower along with the train. This only showed what could be done without any special effort whatever. It is only this year that the two companies have settled down to show what they could do. I believe the time may be still further cut down to four days. With such a service as this, it opens up vast possibilities in that market for our plums and peaches. The express rates are so extravagantly high that we cannot compete successfully with the California and Washington State products, except when the crops in those states are comparatively light and the price high. When these States have heavy crops they lay down in the cities and towns of our North-west by freight their fruit which is of a dry, mealy character in perfect condition. To meet them we have got to lay ours down by freight. With the best possible freight service this can be done to a large extent at any rate. We entirely occupy that market with our grapes, pears and tomatoes, because we can lay them down by freight, but we do not occupy that market with our peaches and plums for the reasons I have stated.

I look forward with a great deal of confidence to the future prospects for fruit-growing in Ontario. We have the natural conditions of soil and climate to produce the best fruit and the most regular crops of it of any place perhaps on this continent. Given such natural conditions, if we fail in occupying all the markets in the Dominion of Canada it is because we are negligent and careless. With proper attention to the production of fruits of quality, to the proper packing of them, to the judicious marketing of them and their rapid transportation to destination, one of the main occupations of all the best lands in Southern Ontario might be the growing of fruit of one kind or another, for the markets of this country are expanding at an enormous rate. Probably 250,000 people who are entirely consumers of our fruits are added to our population each year and will in all probability continue to be added for many years to come.

This Society, as the parent fruit-growing society of the Province, has a most important function to perform in educating and directing the energies of those who have a taste for fruit culture, and I trust it will not fail in its duty.

REPORT OF SECRETARY, 1909.

Membership. The membership of the Association is 793, showing a gain over the past year when the total was 718. As usual the great majority of members came in from affiliated associations. The names of the Associations, and the number sent in by each, are as follows: Clarkson F.G.A., 88; Forest F.G.A., 33; Dunnville F.G.A., 31; St. Catharines Cold Storage and Forwarding Co., 151; Niagara Peninsula F.G.A., 66; Burlington F.G.A., 34; Oshawa F.G.A., 54; Kingsville F.G.A., 25; Norfolk F.G.A., 186; Chatham F.G.A., 28; Arkona F.G.A., 18; Alvinston F.G.A., 9.

There are still quite a number of local associations that are not represented, but it seems almost impossible to get them to see the wisdom of uniting with us. The privileges of membership are of course worth many times the small fee contributed by these Associations, but even at the low figure set by the constitution there are many persons who object to paying the fee of fifty cents to join the local Association. There are many large apple-growing counties where at the present time

there are no organizations that are looking after the interests of the men engaged in the industry. Could these districts be properly organized it would mean a large increase in the membership.

COMMITTEES. The Co-operative Committee has met during the year at different times in an effort to further the interests of the existing shipping associations and to aid in the efforts put forth to organize new associations. The members have co-operated with the Fruit Branch and the Institute Branch of this Department in the arrangements for the holding of special fruit institutes. As a result a number of new associations have been started and others strengthened. Among those operating for the first time last year were Watford, Alvinston, Cobourg, and Grafton. This Committee also sent out a circular early in the spring covering wholesale prices for supplies, such as chemicals, hose, pumps, fertilizers, boxes, barrels, baskets, etc. There was also prepared a circular giving the names of the shipping associations, together with their secretaries or managers and the probable output for 1909. This was very widely distributed, not only in the West but among dealers in Ontario and Great Britain.

TRANSPORTATION COMMITTEE. This Committee has already reported at length at the time of the Annual Meeting showing what had been done before the Railway Commission in reference to express rates. The Commission has as yet given no decision in respect to this matter, so that no further action has been taken.

The action of the Dominion Express in deciding to discontinue their business at Niagara and Queenston and the raising of the rate by the Canadian Express necessitated the Chairman of the Committee, Mr. Bunting, going to Ottawa at the very busiest time of the year to protest against this action before the Railway Commission. The decision of the Board was given in favor of the fruit-growers.

HORTICULTURAL EXHIBITION. In 1908 the Horticultural Exhibition closed with a deficit of some $275. To meet this the show was only able to pay 85 per cent. of the prize money, the balance in the fruit section being paid out of the funds of our own Association. This year by economy in the expenditure for decorating and lighting we were able to come out with a small surplus of about $90. Our prizes have been paid in full from the show funds for the first time in the history of the Exhibition.

The financial statement of the show indicates that the attendance from outside points was considerably greater than 1908. At the same time the attendance from the city decreased very largely. Some of the Directors of the show seem to think that it is due to the unsuitability of the St. Lawrence Market for a show of this kind. There seems to be no other building, however, large enough in the central part of the city, and it is rather difficult to know just what action to take in regard thereto.

This year our apple growers complained very much about the dates of the Exhibition, claiming that it was usually impossible so early in November for them to leave their homes. The general opinion seems to be that the Show should be held about the last week in November and this opinion is also held by the vegetable growers and bee keepers. At the same time the commercial florists are in favor of even an earlier date so as to avoid all danger of injury to their pot plants from the frosts—in fact the displays of flowers have been much poorer the past two seasons owing to discontent among the flower men, and should the dates be made later it is doubtful whether we would be able to hold them with us. The question is, could the Show be made to succeed without this section? Our Com-

mittee will require some backing from the Directors if the Show is to be carried on as a purely fruit, vegetable and honey show.

Two good features of the fruit section this year were the special displays from the counties of Huron, Northumberland and Durham, and Norfolk, and the specimen apples, the prizes for which were contributed by members of the Association. The judges, in making their awards for the specimen fruits, made the following suggestion as to sizes, stating that the limit this year disqualified certain specimens otherwise worthy:

Baldwin, to be changed to 3 to 3¼ inches.
Greening (R.I.), changed to 3 to 3¾ inches.
King, to be changed to 3 to 3½ inches upper limit.
McIntosh, to be changed to 2½ to 3⅛ inches upper limit.
Spy, changed to 3 to 3½ inches.

Financial Statement of Show.

The Show accounts have not yet been straightened up, but the advance financial statement of the Exhibition shows receipts and expenditures as follows:

Receipts.

Grants:	
Ontario Government	$2,000 00
City of Toronto	600 00
Toronto Agricultural Society	100 00
York County	25 00
Etobicoke Township	25 00
Donations:	
Toronto Electric Light Co.	100 00
Sales:	
Fruit and Flower Booth	74 62
Auction, Fruit	18 55
Auction, Flowers	62 60
Ticket Sales:	
Grand Trunk Ry.	252 00
Canadian Pacific Ry.	134 75
Canadian Northern Ry.	50
T. H. & B. Ry.	3 75
Coupon tickets (Net)	358 85
Members' tickets (Toronto Gardeners' & Florists' Association)	11 00
Members' tickets (F. F. Reeves)	3 00
Members' tickets (E. T. Reed)	22 00
Gate receipts	888 80
Advertisements:	
Beekeepers' Association	12 00
Foster Pottery Co.	10 00
Cranston Pottery Co.	7 00
Oakville Basket Co.	12 00
White Co.	12 00
Pilkington Bros.	20 00
Brown Bros.	12 00
Cooper & Nephews	12 00
J. A. Simmers	25 00
J. H. Dunlop	12 00
R. W. King	12 00
R. D. Harling	7 00
Steele Briggs	20 00
Connon Floral Co.	7 00

Davis Pottery Co.	7 00
Grasselli Co.	20 00
Fruit Growers' Association	12 00
Telfer Manufacturing Co.	12 00
Stone & Wellington	12 00
Dominion Agricultural Office	12 00
Biggs' Fruit & Produce Co.	12 00
Chemical Laboratories	20 00
A. Kent	7 00
E. D. Smith	12 00
Dominion Express Co.	12 00
Ontario Vegetable Growers' Association	12 00
J. B. Smith	7 00
Concessions:	
Cooper & Nephews	12 50
Standard Chemical Co.	20 00
King Construction Co.	20 00
Niagara Spray Co.	20 00
Grasselli Co.	20 00
Biggs' Fruit & Produce Co.	20 00
E. C. Brown	20 00
Batts' Limited	20 00
Special Prizes:	
D. Johnson	10 00
E. D. Smith	10 00
J. A. Ruddick	10 15
J. E. Johnson	10 00
W. H. Bunting	10 00
R. B. Whyte	10 00
Ontario Fruit Growers' Association	300 00
Ontario Vegetable Growers' Association	50 00
Miscellaneous:	
Ontario Beekeepers' Association	5 00
Balance from 1908	82 56
	$5,667 63

EXPENDITURES.

Decorating, Heating, Etc.:	
Consumers' Gas Co., gas	$42 30
Consumers' Gas Co., piping	418 05
Wheeler & Bain, heating	157 30
Wm. McGill, fuel	16 00
Mt. Pleasant Greenhouses, evergreens	35 00
Victoria Club, etc., evergreens	22 00
Orr Bros., meals	12 30
Russel Hardware Co., hardware	12 70
F. F. Reeves, oak boughs	10 00
Music:	
Jas. Glionna	186 00
Labor, Cartage, Etc.:	
G. H. Mills, for carpenters, etc.	176 15
I. Gilmore, cartage	46 75
P. W. Hodgetts, for doorkeepers, etc.	16 00
R. Brimstin, doorkeeper	13 00
R. G. Nelson, doorkeeper	10 00
Miss Curtis, ticket-seller	12 50
Miss Rogers, ticket-seller	12 50
City Carpenters	18 91
G. H. Mills, Superintendent	60 00

Office Expenses:	
G. Elder, messenger	7 50
T. Murphy, clerk	31 75
E. T. Reed, sundries	5 65
Bell Telephone, rent of 'phone	15 00
United Typewriter Co., rent of machine	2 00
Treasurer's stenographer	10 00
Staging, Tables, etc.:	
J. B. Smith, lumber	62 00
Kilgour Bros., paper	36 40
T. Eaton Co., rooms for decorated tables	57 90
Adams Co., rent of tables	10 00
Harry Webb Co., rent of silver, etc.	16 00
Printing, Badges, Etc.:	
J. F. Osborne, prize lists, etc.	488 25
Methodist Book Room, signs	50
A. Kent, badges	32 70
Advertising:	
Reed & Day, signs	12 50
Connor Ruddy Co., bill posting	44 00
Woods Norris Co., ads.	159 85
Mail & Empire	37 80
World	22 40
Globe	37 80
Star	35 40
Telegram	38 40
News	26 60
Montreal *Star*	15 00
Home Journal	10 00
Canadian Horticulturist	50 00
Canadian Florist	21 00
Farmers' Advocate	40 00
W. G. Rook, Advertising Manager, etc.	100 00
W. G. Rook, commission on ads.	83 50
W. G. Rook, commission on concessions	18 00
Prizes:	
Flowers	1,105 00
Fruit	1,004 25
Vegetables	391 25
Honey	256 00
Miscellaneous:	
Secretary, Rugby Hamilton Club, commission on tickets	10 25
W. H Bunting, fruit	25 70
St. Catharines Cold Storage Co., fruit and baskets	6 80
Norwich Union Assurance Society, insurance on lumber	4 00
	$5,607 61

American Pomological Society. Owing to the season of the year when the meeting of this Society was held in Ontario, very few of our members were able to attend. The number of American visitors was not as large as was expected, but the meetings were well attended, and much interest was shown in both the programme and the exhibit of fruit put up at the Niagara Peninsula Horticultural Exhibition, which was arranged for the same dates. The visitors were shown over the orchards of the Niagara district during two days of the time that they were in the country, and were also taken on an excursion to the Agricultural College at Guelph. Everything was done to make their visit in the country as pleasant and profitable as possible. The Secretary was much indebted to those of our Directors and members who were able to be present during the week.

Publications. In addition to the annual report of the Association, which was issued by the Government as usual, there was printed a small pamphlet entitled "Success in Apple Orcharding." The various articles contained therein were written by members of the Association who were considered to be best fitted for the subject under discussion. The pamphlet was well received and was distributed very widely over the Province. The Minister of Agriculture, through the members of the Legislature, placed a large number of copies, in addition to which many applications were received here at the Department for single copies in response to special notices which were put in the agricultural press early in the season. Altogether some 8,000 of this publication were distributed.

The Annual Meeting was held as usual at the time of the Horticultural Exhibition and was well attended notwithstanding that the dates were too early to get the attendance from the apple-growing sections. There were present thirty-five delegates from local associations in affiliation with this Association. Outside of speakers from Ontario we brought in three men from New York State and one from Michigan at an expense of $113. The addresses of these men, three of whom were practical fruit growers, proved of great interest and well worth the expense to which the Association was put.

New Work. The Association is in a position financially to undertake some work along new lines, and this matter could possibly be discussed more fully now, so that the Executive would have some instructions early in the season. Your President, in his annual address, made note of a number of important points, and it would be well to act along some of the lines suggested. He mentions specially the matter of legislation, schools for packers, special fruit institutes, dissemination of information as to the identification of varieties, marketing and the introduction of new varieties for seasons of the year not now covered by present varieties. It would seem that the Association might well devote its energy this year to the solving of some of these problems.

The Treasurer's report was then read, received and adopted (see page 6).

Committees.

The following committees were appointed, viz.:

Nominations.—W. Dempsey, Robert Thompson, Thomas Foster, A. Onslow.

Resolutions.—F. S. Wallbridge, C. L. Stephens, W. L. Smith, Major Roberts.

Legislation.—Murray Pettit, Harold Jones, E. E. Adams, William Rickard.

SMALL FRUIT CULTURE IN ONTARIO DURING THE PAST FIFTY YEARS.

By A. W. Peart, Burlington.

The foundation of the small fruit industry was probably suggested to our forefathers by the profusion of rich wild fruits found flourishing in waste and uncultivated places. In many sections of the Province to-day there are still hundreds of acres of raspberries and blackberries growing in a state of nature. Those present of middle age and beyond will frequently recall the garden plots of their boyhood homes, and doubtless often indulge in pleasant reminiscences of the

luscious fruits grown therein. The memories are sweet and precious, but sweeter far were the fruits of the old garden. None since have tasted quite so good.

The stout-hearted, brave pioneers of the country, whose toil and fidelity have made possible the comforts and advantages we now enjoy, were not unmindful of the choice offerings of nature, and in many of their gardens fifty years ago were to be found strawberries, raspberries, red and black currants, and gooseberries. At that time were the Hovey and Hooker strawberries, the Franconia, Belle de Fontenay, Falstoff, red, white and yellow Antrolip, Brinckles Orange, Marvel of Four Seasons and the Black Cap raspberries; the Houghton Seedling, Whitesmith Sulphur, Crown Bob and Mountain Seedling gooseberries; the Red Dutch, Cherry, White Grape, White Dutch, Black English, Naples, Red Victoria, Prince Albert and Houghton Castle currants. The New Rochelle or Lawton blackberry was also grown, but except in the southern part of the Province was found too tender without winter protection.

I am informed that fifty years ago there were a few strawberry plantations in Upper Canada, that in Lincoln strawberries of many varieties were grown and sent to market, also in Wentworth, Halton and Peel. In the Burlington district William Bell, Stephen Smith and Myron Dunning were among the pioneer growers. Near the cities and large towns some currants, gooseberries and raspberries were also raised by market gardeners. It is estimated that all told fifty years ago there were in this Province fifty to seventy-five acres of small fruits grown for sale.

At a meeting of the Fruit Growers' Association of Upper Canada, held in the City of Hamilton on the 19th day of July, 1861, a Committee was appointed to prepare a series of questions in relation to fruits, to be sent to agricultural and horticultural societies and prominent men throughout the country. The replies were referred to a committee composed of D. W. Beadle, Secretary, of St. Catharines; Philip Gregory, of Louth; and J. Alexander Campbell, of Grantham. They reported that sixty-eight responses had been received from thirty different counties, which geographically were well distributed throughout the Province and that much valuable information had been gathered concerning the character and adaptability of the different kinds of fruits. Thus, fifty years ago was born in the Province of Ontario an infant industry, a child of Pomona, the birth being subsequently duly registered and accredited by the Fruit Growers' Association.

Regarding small fruits the Committee said in part: "Judging from these returns it would seem that there is no part of our Province, however severe the climate, where the settler may not enjoy some varieties of most delicious strawberries, gooseberries and currants," and further, "to these may no doubt be added the Black Cap raspberry."

In 1869, Thomas Chisholm, of Esquesing, Halton County, reported to the Association that there were sixty acres of strawberries fruiting around Oakville, that the prospects were so good that the acreage had been increased to 200, and that in one day 400 bushels had been shipped to Toronto and Montreal. He also stated that there were nine acres at Georgetown. Wilson's Albany was the favorite. The report of 1869 also refers to several acres of raspberries near Oakville. No doubt other favorable localities in the Province were also making similar progress. The tariff imposed on fruits in 1878 encouraged the grower, and placed the industry on a firmer basis and made prices more stable.

In 1879, A. M. Smith, of Port Dalhousie, in addressing a meeting of the Association, said that there had been a great advance in growing strawberries during the past ten years, but that the raspberry industry was still in its infancy.

In 1881, the Snyder blackberry, Lees Prolific, and Saunders black currants, the Sharpless Strawberry, and the Peal gooseberry are recorded. In the report of 1890 the Williams strawberry is said to have been originated by Mr. Williams near Brantford.

In the period, 1879-1889, the acreage of small fruits increased very rapidly, especially in strawberries, raspberries and currants. Blackberries and gooseberries were also beginning to challenge the attention of the grower. In raspberries the Marlboro and Cuthbert were bidding for premier positions; as also were in currants and Cherry, Fay, Naples, Lee, and Champion; in gooseberries, Smith's Improved and Downing: in blackberries, the Snyder, Lawton and Kittatiny; and in strawberries, the Wilson, Crescent and Sharpless.

The following period, 1889-1899, was marked by dark days to the small fruit grower. This was due partly to over-planting and consequent over-production, and partly to the searching trade depression which was continental in character. Small fruit plantations were all but neglected, and even growers on a very large scale were only able to reap but a very narrow margin of profit.

Towards the close of the century, however, the canning factories and a few far-seeing and progressive dealers began to relieve the congested markets and a reaction set in.

The next decade, which is closed by the present year, introduces a revival in small fruits. An important factor in maintaining prices is the large demand of the jam factories. Four years ago Mr. E. D. Smith, of Winona, built a factory which absorbs annually thousands of cases of strawberries and raspberries, as well as all other fruits, thus relieving the commission markets, and insuring better and steadier prices to the grower. Other jam factories have since been erected. These, with the constantly increasing number of canning factories—some sixty-seven at present—create a healthy demand which consumes probably one-third to one-half of the strawberries and raspberries under cultivation in the Province. Such organizations as the St Catharines Cold Storage and Forwarding Company strengthen our nearby markets by seeking new fruit outlets in the west.

Estimated acreage of small fruits in Ontario, 1909:

Strawberries	4,500	acres.
Raspberries	2,000	"
Currants	1,000	"
Blackberries	1,000	"
Gooseberries	500	"
Total	9,000	"

Estimated capital invested in small fruits, $3,150,000.

As time goes on fruits have multiplied and there are scores of varieties of strawberries, raspberries, blackberries and currants claiming recognition, some of them possessing real merit. The sifting of these was the purpose of the Fruit Experimental Stations established throughout the Province in 1895-6.

Following is the general list of varieties of small fruits recommended to be grown for market by the Board of the Ontario Fruit Stations in 1907. This list is based upon several years of experiment at the various stations:

STRAWBERRIES: Beder Wood, Splendid, Warfield, Greenville, Williams, Saunders, Sample, Irene, Buster.

RASPBERRIES: *Red*—Marlboro, Cuthbert, Herbert; *Black*—Hilborn, Older, Gregg, Smith's Giant; *Purple*—Columbian, Shaffer; *White*—Golden Queen.

CURRANTS: *Red*—Cherry, Fay, Pomona, Red Cross, Victoria, Wilder; *Black*—Victoria, Champion. Lee, Naples, Saunders; *White*—White Grape.

BLACKBERRIES: Agawam, Snyder, and for southern sections Kittatinny.

GOOSEBERRIES: Pearl, Downing and Red Jacket.

It is important to note that the adaptability of some of the above varieties is very local indeed, especially in the case of strawberries.

In the evolution of the industry new problems are constantly confronting the grower; the variety best adapted to a certain soil and locality, proper care, cultivation and pruning, how to dispose of injurious insects and fungi, lowering the cost of production, finding good markets. These and many other questions are perpetually pressing for solution.

The outlook appears promising. A better system of distribution, the increase of population in our towns and cities, and the advancing tide of emigration towards our North-West are creating a demand for our fruits, both fresh and canned, the potentialities of which are practically as unlimited as the vast areas of virgin soil that are still unpeopled.

Such is a brief record of the birth and infancy of the small fruit industry in Ontario. Are we not warranted in looking forward to a young and vigorous manhood?

MR. ROBERT THOMPSON: In regard to the Western market, Mr. Peart referred to the number of cars of fruit sent from St. Catharines to the west. Last year we sent a large number of cars to the west, nine cars going to the west alone at one shipment. Five or six years ago the Railway Commission made a test of five different makes of refrigerator cars to the western market which was not very successful. I think there is a greater future for our tender fruits than we ever had before, population increasing. North-West market growing.

A MEMBER: How far west?

MR. THOMPSON: We shipped to Winnipeg, and one car went as far as Saskatoon. Professor J. W. Crow, who was out west last year, stated that while the berries looked a little soft, they were in comparatively good shape and canned well. We can make up a load of ten cars, supply a good crew for it, and ship right through to the west.

THE PRESIDENT: Mr. Thompson's efforts this season are highly appreciated by the fruit growers around St. Catharines, and I think that another year the benefits will be even greater than they were this year. The Cold Storage has done excellent work in the interest of fruit growers, and all those in that district should combine to send out their fruit to the west.

A MEMBER: What variety of strawberries were shipped? Did not one carry better than the other?

MR. THOMPSON: Almost all the berries were Williams. Half a dozen crates at the outside were Pan-American and one or two of some other variety. The Pan-American did not carry well. There is no trouble at all in sending out large quantities of Williams berries, if we pick them in the first half of the picking season.

THE PRESIDENT: I think that the Williams is the best variety of strawberries yet. Pick the berries on the green side and they can generally be shipped to Winnipeg with success. I gave it up for the reason that it was impossible to get growers to pick the berries in that condition. Pickers are scarce; almost always there is a scarcity of help. The rain comes on, pickers cannot pick one day, the berries ripen too fast. The ripe berries must be picked off, if we would obtain the best result. No retail dealer in Manitoba has any excuse for not having all the Ontario fruit he wants. I would guarantee to lay fruit down there sound.

THE OVERPLANTING OF STRAWBERRIES AND THE WESTERN MARKETS.

By ROBERT THOMPSON, ST. CATHARINES.

In taking up this subject we must look at it from a disinterested standpoint. If so, I must say at once that strawberries are not overplanted, but that there is under distribution. The great consuming public, except in a few centres, have not begun to get all the berries they want, and they have, in many instances, had to pay very high prices. Of course, the man who has been induced by the fairy tales of the real estate agents, and those who have land to sell and are not over-exact in their representations of the profits derived from fruit growing, to purchase land at high prices expecting to obtain fancy prices for his fruit, will say that berries are overplanted, and that prices are too low. But we must remember that berries can be grown over a large area of our country, and if there should be at any time too large profits there will be many ready to enter into the business, and we must be prepared to sell at reasonable prices, and, at the same time, use common sense and good judgment in disposing of our crop.

The grower has many troubles to contend with in growing the berries, and if he has by good care and cultivation secured a good crop, he need not feel that he is forced to sell to the canner or the jobber at the first price offered if it is not deemed sufficient. The general market will always pay a fair average price. We have growers who always get cold feet if we have the promise of a full crop, and rush to sell at any price, and if they can sell for a fixed price and the promise of any rise in the market, they think they are making a good bargain, when, as a matter of fact, if any number sell this way they make it impossible to have any rise in price.

Take this season, for instance. The canners had sold all of their stock of canned berries and were bare, but they anticipated a good crop and put the price of berries from 3¾ to 4½ cents per box. Many growers thought they had to take this offer and sold. Others held out, owing to the cool weather. Berries ripened late and came in a rush, prices fell for three or four days, and the factories thought they had the growers and bought at from 2 to 3 cents per box. Of course this was a ruinous price to the growers who sold. Owing to these low offers, the most of the berries were shipped and the shippers did better than factory prices. I have investigated the sales of many of our growers and find, in every instance, where they put their fruit up properly, that they made more by shipping. I will give one grower's returns from the lot, which is one of the lowest returns taken, because he shipped all of his berries to Toronto to one of the commission houses, so that he had no fancy outlet. He shipped 512 crates of 24 boxes and they netted him 4 1-6 cents per box, after paying all ship-

ping charges, crates, and boxes, and as he says, with four advantages over the factory: first, the disposal of the whole crop; second, cash every week, to some men very important; third, handling everything new; and, fourth, no canning factory abuse, most important. When the berries were pretty well picked, the factories had not enough packed to fill their orders, and the pack is again short. They dare not offer more money to secure berries, as if they had done so they would have had to pay the advance to those to whom they promised the rise.

In regard to the North-west as an outlet, I feel confident that within a few years that market will take a lot of our berries. Our growers at St. Catharines sent out three cars this season with, on the whole, fair success financially, and secured a lot of valuable information and experience. Before sending, the growers were skeptical as to the carrying qualities of the berries; the consumers in the West were doubtful After the berries were shipped, sold and used, we found that the berries will carry safely; the buyer found that our berries were better in flavor and would stand up long enough to use and can, and they are prepared to buy Ontario berries more largely in the future.

One word as to that market. Our Association has sent out nearly 150 carloads to the West this season of tender fruits, and there has been between 400 and 500 cars all told (as near as I can gather) sent out from the Niagara district, and our experience is that if we go after that market in a business-like manner and arrange to supply the public regularly with Ontario fruits, the people out there are ready to give our fruit the preference. But to succeed, we must pick our fruit carefully, and at the proper stage of ripeness, and use good packages, load the cars properly, and see that fruit is quickly cooled. We must also have the Railway Commission lower the rates to points west of Brandon. The rate to Winnipeg is 66 cents per cwt., while west of Brandon the rate runs from $1 to $1.66 per cwt., which is almost prohibitive. If we can secure rates in proportion to what we have to Winnipeg, Portage, and Brandon, to other western points, I can safely predict that inside of three years more fruit will be shipped to western points than will be shipped to Ontario and eastern markets, and we will not hear so much of overplanting.

I wish, on behalf of the growers, to thank the Minister of Agriculture for Ontario and the officials in charge, for the efforts and assistance rendered in gaining information as to the needs in shipping and in making such splendid displays of Ontario fruit at the Winnipeg and Industrial exhibitions.

SMALL FRUITS IN THE YOUNG ORCHARD.

By L. A. Hamilton, Lorne Park.

What would you do with four acres of land if you wanted to engage in fruit raising? It is such a question as this that one is frequently called upon to answer. Speaking to a recent enquirer my reply was, I would plant it out in young apple trees and between the rows would grow small fruits. This answer would, of course, not be applicable in every case, as the question of climate, soil, markets and like conditions must be taken into consideration. But speaking from the experience gained during the past six years in developing an orchard in the Clarkson district, this would be my answer. In giving this opinion I would at the same time sound a note of warning, viz.: that while the growing of small fruits in my

orchard has been carried on successfully and profitably, it is impossible to say yet how far the future life of the fruit trees has been impaired by this process. In other words, while the ground crop has proved a success time only will show whether the main point aimed at—the developing of an orchard—could not have been better secured by some other practice. It seems almost presumptuous for me to speak on this subject before men who have made this and like studies a life practice. But there are many amongst the members of our Association who, like myself, having led an active business life are now going back to the land; and it is to this constituency I now address myself. I would just like to say here in passing that this movement is growing, and it is to me one of the brightest features in our present day Canadian life.

For the purpose of bringing this subject before you in a practical way, let me take as an illustration one of the four acre orchards on my farm; this was planted out in standard apple trees with fillers of cherries, plums, pears, and peaches in the spring of 1904; the apple trees were set out in rows forty feet apart in a field that had been in clover the previous year. In 1905 one-third of the land was laid out in strawberries and raspberries and the remainder in a hoe crop. In 1906 an additional area was added to the strawberry and raspberry plantation; the same practice was followed in the year 1907, so that by the time the entire four acres was either bearing a crop of small fruit or was planted in readiness for the subsequent years. I estimate that the hoe crops produced from the land in these early years was sufficient to pay for the cultivation. The fruit gave me a gross selling value as follows:—

Cash Receipts.	Cr.
For 1906	$ 282 68
For 1907	393 30
For 1908	1,018 90
For 1909	1,336 64
Total of 4	$3,031 52
" Cost	1,481 00
Net Receipts	$1,550 52

Cost.	Dr.
Commission, express and cartage, 20%.	$606
Picking	420
Packages	175
Fertilizers	160
Plants	50
Planting	20
Trees	50
	$1,481

I estimate, as stated, that the vegetable crop paid for the cultivation of all. With one exception, viz., that I spray the strawberries with Bordeaux mixture, I have followed the general practice of growers in my district. We differ from the Niagara practice, inasmuch as the strawberries are heavily mulched with straw manure for a winter covering, and two crops are invariably gathered before the plants are plowed up. The second crop on the strawberry bed in this orchard yielded this year over twelve thousand boxes from an acre and a half. They were as fine a sample as I have grown. (For confirmation of this I refer you to Mr. Hodgetts, the Secretary of the Association, who saw the patch when it was in full fruit.) Gross value about $800 at a cost of $75.

In the meantime how have the apple trees fared? All I can say is, that they have made a strong growth, the loss from all causes not exceeding ten per cent. This year in addition to the crop of cherries, pears, and plums on the fillers, two of the apple trees, an Ontario and Duchess, fruited for the first time, giving, although few in number, perfect samples. I have been told that the growing of raspberries in orchard is not considered good practice; I have nothing to show that they have been injurious to the young trees. This much I know that in this portion of the orchard seven old Spy apple trees were left standing after I put in the pruning

axe to the old orchard. These trees yielded twelve barrels of wormy apples in the year before the raspberries were planted, whereas this year, after living in the company of raspberry bushes for five years, they gave me fifty barrels of sound apples, while the raspberries backed them up by adding over six thousand boxes to the crop. This convinces me that apples and raspberries will feed off the same plate provided the food is there. To sum up briefly, the accounts show that by the practice of growing small fruits in the young orchard I have reared a young orchard to the bearing point without costing anything, and have a handsome profit to its credit from the ground crop of small fruits.

IS GRAPE GROWING PROFITABLE AT PRESENT PRICES.

By Murray Pettit, Winona.

At this year's prices there is no money in the growing of grapes. The bulk of the crop sold at from 8 to 13 cents per 8 lb. basket where twenty-five years ago we used to get as much for a single pound.

The cost of establishing an acre of grapes in the Winona district is as follows:

Vineyard land per acre	$125 00
430 vines at 3c	12 90
Preparing the land and planting	8 00
136 posts at 16c	21 76
Setting posts at 5c	6 80
309 lbs. wire at 3c	11 27
Bracing end posts and stapling wire	6 00
Cultivation and pruning for 3 years	30 00
	$221 73
Interest on investment for 3 years	33 25
	$254 98

After the vineyard is established the cost of production on one acre is as follows:

Interest on total investment at 5%	12 74
Pruning and tying	6 00
Cultivation	8 00
Spraying and fertilizing	9 00
Picking, packing and delivering	13 00
Baskets, 750 at 3½c	26 25
Interest and repairs on machinery	16 00
Total cost per acre	$90 99

If the production was 750 baskets of grapes per acre selling at 10 cents net, the returns would be $75.00, or a deficit of $15.99. If the price was 11 cents the deficit would be $8.49, while at 12 cents the grower would still lose 99 cents. The grower must get 13 cents before he can begin to show a profit. A fair return could be obtained by selling the Concords and Niagaras for 15 cents and the Rogers for 20 cents to 25 cents, and these prices could be obtained if all the dealers and associations in the district would co-operate.

If it were possible for the inspectors to prevent the shipping of green grapes early in the season this fruit would sell much more rapidly and in larger quantities. The past season Niagaras were being shipped west when Moore's Early and Champion were being cut.

Mr. Thompson: I believe that we can produce grapes for very much less than the figures given by Mr. Pettit. In regard to the premature marketing of the fruit, this will work out its own cure. The man who ships the green grapes under present conditions will get less money than if he had waited a little while. Ripe Champions were certainly better than green Niagaras or Concords. We will have to continue to educate our shippers in regard to this matter.

Mr. Pettit: I believe that it will require more than education. Legislation seems to be necessary to prevent this kind of fraud.

The President: I agree with some of the speakers that Mr. Pettit's figures are a little high in reference to the cost of bringing an acre into bearing. As far as prices are concerned, growers should not be discouraged because grapes sold at the end of the past season at a loss. The wine manufacturers have not been purchasing for two years, and a lot of grapes have been thrown on the market which in the past were made into wine. However, unfermented wine will likely be made in the near future in Ontario, and may take as much as one half of the total crop. We cannot expect that co-operation in itself will raise prices. The middlemen who are in the business to-day are still absolutely necessary to the collection, distribution, and sale of this crop.

Mr. Bassett: In the Association at Lanton, Michigan, they have a system of inspection to prevent any green grapes being shipped. This matter is within the control of any co-operative association, as the managers soon find that it does not pay. Immature grapes at all seasons of the year should be refused. The Lanton Association had raised the price of grapes 2½ cents per 8 lb. basket for their members, which was a striking tribute to the value of co-operation in the marketing of grapes.

F. Goring, St. Davids: I am also of the opinion that Mr. Pettit's figures in regard to the cost of production are too high. With a lighter soil on an earlier location my figures would be much lower.

NEW YORK GRAPE GROWING METHODS.

By D. K. Falvay, Westfield, N. Y.

The grape industry of Chautauqua County had its birth about 1818, when about a dozen roots of the Fox grapes were planted. These vines grew very rapidly, but the fruit was of inferior quality. In 1824 a plot of ground about two by six rods was planted to Isabellas and Catawbas. These varieties proved to be well adapted to the soil and climate. Very little effort was made, however, to cultivate this fruit until about 1859. At that date twenty acres of bearing vineyard would be a good estimate. At the present time there are thirty-five thousand acres in the Chautauqua Belt.

The Concord grape was introduced some time in the fifties and is the standard grape. Some Niagaras are raised, but of late years they have not found a ready market, the price rarely being equal to that of the Concord. Only a very few of other varieties are grown, and are mostly sold in local markets.

Our grapes were formerly set eight feet in a row, the rows being nine feet apart. For the past few years the roots have been set six or seven feet apart in the

row, the object being to put up fewer canes from each vine and still maintain an average. The posts should be between the third and fourth vines to prevent the wires from sagging when loaded.

The best roots obtainable should be purchased. They are now so graded that those designated "Extra Number Ones" are the kind to get. Other grades are set, but the best are always the most satisfactory. For the past few years newly set vineyards have not done as well as in former years. The cause has not been definitely determined. It is believed by some that the vitality of the grape cuttings has been weakened by the general deterioration of the vines from which the grape brush is taken for cuttings.

With all the fungus diseases, anthracnose, etc., infesting the vines, the grape root grower should use extra precaution in obtaining grape brush for cuttings. I believe no wood should be used unless taken from sprayed vineyards.

These roots are set very deep, from fourteen to eighteen inches below the general surface of the soil. As the ground is worked the high centres are gradually worked toward the roots. Corn or potatoes are usually planted between the grape rows the first year. The first year's growth is cut back to two or three buds the second spring. The third spring the canes are tied up; not more than two canes should be used. One and a half canes are better, that is, one cane to the top wire and a shorter one to the bottom wire, the shorter cane making the better wood growth for the following year. Invariably the best growth of wood is near the top of the cane, and if both canes are tied to the top wire the growth of wood will be too far from the ground to make a good shaped vine. The first wire is usually 24 inches from the ground; the second wire is from 26 inches to 28 inches from the lower wire.

The canes are tied with No. 21 wire cut about five inches long, and so twisted around the cane and trellis wire as to come off with the old wood. String is used when necessary to tie any of the canes to the lower wire. Tie a loose knot to prevent girdling. We tie but once, unless some of the vines should be broken down with wind or other causes. A good tier can tie an acre a day in a vineyard with four canes to the vine. There are from 540 to 600 vines per acre according to distance apart in the row.

It requires about six years to get a strong vineyard, that is, one that is capable of supporting from four to six canes. The constant temptation among vineyardists is to tie up too many canes on young vines and by so doing injure their vineyards seriously.

In old vineyards we usually put up from four to six canes if the vine will support that many. The judgment of the trimmer must be exercised constantly. He must treat each vine individually, and not only trim for the present year but also must have in view which canes and buds will produce wood in the proper place for the following year's crop.

An extra good trimmer will trim an acre of heavy vines in from ten to twelve hours. This work is done during the winter months. After the brush is pulled from the wires it is drawn out by a team hitched to a long pole. Two men with a team can pull out and burn the brush from ten or twelve acres in a day. The work in the vineyard is all done by horse power except the hand hoeing. The one-horse plow, the gang plow, the spring tooth harrow, and the two-horse vineyard cultivator, with the disc wheel to guide it, are the principal tools used during the season. The horse-hoe, of course, is used for cleaning out under the wire.

The Chautauqua grape grower has the method of cultivation reduced to a science. Nowhere are grapes cultivated so cheaply or rapidly as in Chautauqua County.

A vineyard should be gang-plowed twice during the season, horse-hoed and hand-hoed once, and be cultivated every ten days, at least, up to August 10th or 15th. The cost of trimming, tying, and care should be about twelve dollars per acre up to time of harvesting.

Vineyards infested with grape pests, such as the root worm and "leaf hopper," require special treatment, that is, cultivation and spraying, which adds to the expense above quoted.

Spraying. All vineyards should be sprayed at least twice for the "root worm," and several times if affected with rot. Poisoned Bordeaux is used for the fidia or root worm, and also for the grape berry moth, which produces wormy grapes. The first application is made when the grapes are just past full blossoming, and the second application is made about ten or twelve days later. The material costs about a dollar and thirty cents an acre for each application if poison is used with the Bordeaux; with Bordeaux only about seventy cents an acre. With water handy and a good walking team two men can spray fifteen acres in a day. From ten to twelve acres per day is however a fair average.

The benefits from spraying are many. It will control the root worm, destroy the grape berry moth, prevent mildew, check black rot, prevent grapes shelling and keep the vines healthy. Sprayed vineyards have a better growth of foliage, which stays on the vines from one to three weeks longer than on unsprayed vines, thereby fully ripening the fruit and the wood.

Harvesting. The crop usually requires from ninety to one hundred days from date of blossoming to harvesting. Our harvest usually begins about September 25th. A large percentage of the grapes put in baskets are packed in the field in 8 lb. baskets, drawn to the fruit house and wilted 24 hours. The baskets are then refilled when necessary, covered, and taken to the car. Many pick in trays and after wilting the grapes pack them in baskets. This method insures a better grade of fruit. Poor, slack packing has done more to hurt the grape market than any other cause. We need more of the golden rule principles put into effect if we expect to realize the maximum profits from our fruit. Perhaps this rule would be all right with apple and small fruit growers. Honesty is the best principle always.

The car lots are handled by individuals, associations or grape companies. Many cash buyers buy direct from the grower and sell in car lots. Large companies and associations have representatives in all the large cities who look after the business. Very few grapes are consigned. Grapes picked in trays for wine or unfermented grape juice are delivered from the vineyard to the car or wineries.

The size of the crop has varied each year. Our banner crop was in 1900, when the shipment was 8,000 car loads. Since that date several thousand acres of new vineyards have come into bearing, and even with these acres added, the crop has been growing smaller each year, until the present year. This year we had too many.

This enormous business is handled in about thirty days apparently without effort on the part of any one, so thorough are the methods employed. From 25 to 30 per cent. of the grape crop is made into wine and unfermented grape juice. 12,000 tons are used annually for this purpose. The Welch Grape Juice Co. pressed 240 tons each twenty-four hours. The magnitude of this industry and the outlet it provides for the sale of grapes has a great influence on the whole grape producing business. The annual gross income will average two million dollars. After paying

expenses this large amount is reduced one half. Like any other line of business, not all men make a success of grape growing, and there is no reason to think they would succeed. 1,000 eight-pound baskets per acre is a very large yield.

The value of the grape business with its allied industries now surpass the twenty million dollar mark. The soil and climate are well adapted to grape growing. Very little fertilizing has been done. The meaning of the word "cover crop" is not yet fully understood by many growers, and spraying is too dirty and thought to be too expensive by an overwhelming majority of the grape growers in the Chautauqua belt. The virgin vineyards would carry from eight to thirteen canes, and the farmer tied that many up and was sorry he did not have more. He exhausted the soil and weakened his vines. He did not think it necessary to put back anything and consequently had an overdraft. Poor cultivation or lack of cultivation helped the conditions along and caused thousands of acres of poor vineyards.

The "thrip" or leaf hopper has damaged thousands of acres. This insect works on the under side of the leaf. It sucks the juice from the leaf causing it to dry and drop off. The grapes do not ripen after the leaves fall but remain red and unmarketable. The leaf hopper can be controlled by spraying the under side of the leaf with whale oil soap, using from twelve to fifteen pounds to 100 gallons of water. This should be applied before the hopper gets wings. Last season I killed 75 per cent. of the hoppers.

The most serious pest with us is the root worm or fidia, which has ruined thousands of acres in the grape belt. This year it was not so much in evidence. As a result of experiments by the State of New York it was demonstrated that the root worm can be controlled or at least reduced in number below the danger line. This work is performed by hoeing out the pupæ when in the turtle stage, and by spraying just before the beetles feed on the leaves.

The general work of the vineyard should be done intelligently and at the proper time. No business will run itself.

Cost of Production. The cost of production varies somewhat, taken individually, but as a whole may be conservatively figured as follows: On vineyards producing an average of nine hundred 8 lb. baskets or three tons per acre: Labor and expense to time of harvesting $13, baskets $18, harvesting $18, interest and taxes on investment at $200 per acre, which is low value in New York, $14; total $63 per acre. If grapes sell at 10 cents per basket net they would bring $80, which would leave a net profit per acre of $17 above interest on investment. If the average yield of 600 baskets or two tons per acre be figured it would be as follows: Labor and expenses to time of harvesting the same $13, baskets $12, harvesting $12, interest and taxes on $200, per acre $14; total $51. If the grapes sell at 10 cents they would bring $60, leaving but $9 profit above interest and taxes.

Not taking the value of the investment into consideration, it costs the average Chautauqua grape grower to put an eight-pound basket of grapes on the market as follows: Labor to time of harvesting two cents, package two cents, harvesting two cents, total six cents. It is easy to figure the profits or losses if you know the size of the yield per acre.

Treating the subject in ton lots we must figure the cost per acre to time of harvest the same as in baskets, namely: $13, packing a ton of grapes in trays at three cents per tray and sixty trays to the ton $1.80, delivering with team and extra man, labor in vineyard $2 per ton, total $3.60. It requires an extra good vineyard to produce three tons per acre, the average with us being two tons. On a three ton basis per acre it costs $11.40 for harvesting and $13 for expenses up to

beginning of harvest or a total of $24.40 per acre, without interest on investment included. It will be readily seen that the grower will have nothing left after paying interest and taxes with grapes selling at eleven and twelve dollars per ton. We make no charge for packages as the buyer pays for the package after deducting its weight.

Co-operative Marketing. The most serious condition confronting the grape growers at present is a more perfect system of marketing the crop. With all the experience of years in distributing and selling the grape crop in the Chautauqua grape belt we have awakened to the fact that it is possible for one man or association to absolutely control the grape market and force the prices downward, but not upward. This is done by simply quoting prices below the buying price, the order being subject to confirmation.

It is claimed that this method put into operation during the past season was the cause of lowering the price from thirty dollars to twelve dollars per ton in ten days.

Every grape section should be united into one shipping association and the entire crop handled by the officers. Distant markets should be found and the price made f.o.b. cars at loading point. Every grower can afford to wait for a part of his money until the season has closed and the pools made out. Every grape grower would be money ahead if he never sold to cash buyers, as such buyer is always trying to buy under the market, cash being a great temptation to resist. Every car put on the market at a cut price weakens the market for the next shipment; this can be avoided by uniting and sticking to the association.

Another mistake made by the Chautauqua growers in the past is not to provide packages for their crop. This neglect places the grower entirely at the mercy of the wine and juice companies, and prevents him taking advantage of the conditions of the market. The great scarcity of packages in the Chautauqua grape belt during the season just closed caused a loss of thousands of dollars to the growers.

The time to order packages for next year's crop is now. It is better to have and not want than to want and not have.

In conclusion, I can safely assume that personal interests, lack of a perfect organization and confidence in each other, coupled with neglect to do business on business principles and to properly treat the vineyards with care and fertilization are the causes of low prices received and the small crop grown for the past few years. Listen to the advice of the scientific men who are trying to help you and carry out their instructions as far as possible and you will surely be benefitted.

REPORT OF THE TRANSPORTATION COMMITTEE.

By W. H. Bunting, St. Catharines.

During the year 1908-1909 several incidents that have a rather important bearing upon the transportation of fruit have occurred.

Owing to a general demand from all parts of Canada, early in 1908 the operations of the express companies were, by an Act of Parliament, brought under the supervision of the Board of Railway Commissioners. Shortly after an investigation of the various complaints that had been made against the express companies was begun by the Commission.

Your Committee prepared as full and complete a statement of their case as possible, and early in January last, aided by legal counsel supplied by the Provincial Government, presented it to the Railway Commission. As a result of this presentation the Chairman of the Commission ordered that the express companies make an effort to meet the fruit growers with a view to abate and remove many of the grievances complained of. Your Committee regret to report, however, that up to the present no agreement has been arrived at as a result of this conference held in accordance with the request of the Chairman of the Commission, the express companies being unwilling to accept the schedules and propositions as presented by your Committee. As the whole question is still an open one, it will be necessary to press for relief through an order from the Board at an early date.

Amongst the points suggested are the following:

(*a*) A revised schedule of rates by express contemplating a reduction from present rates of approximately 25 per cent.

(*b*) Improved equipment for the carriage of fruit by express.

(*c*) A more rigid supervision of the handling of fruit by employees of express companies.

(*d*) A definite arrangement as to liability for loss through delay or improper handling of fruit.

During the year an application was made by the Canadian Freight Association for an order rescinding the special commodity rate on fresh fruit to western points which was granted in 1904 and under which the trade in tender fruits to the West has greatly increased.

This application was successfully combatted by your Committee. The Board, after hearing the arguments, dismissed the application and the old rate remains in force to Winnipeg, Brandon and Portage la Prairie. Your Committee is strongly of the opinion that these rates should be extended to many other distributing points in the West in order to foster this rapidly growing trade.

Your Committee notes with pleasure the increasing attention that is being given to the transportation of fruit by the officials of the various roads interested, and as a result of that attention fruit is being landed at the points of consumption in a much more satisfactory manner.

I think Mr. C. C. James, the Deputy Minister of Agriculture, touched the keynote of the success of our business last night in his address at the opening ceremonies of the Exhibition, when he stated that it was all very well for us to devote our time to growing good fruit, that it was very necessary that we should do so, but that unless we could place it in the hands of the consumer promptly and in good condition, and at reasonable rates, our efforts would be largely in vain. The endeavor of the Transportation Committee for the past few years has been to assist the members of our Association, and the fruit growers of this Province at large, in an effort to do that very thing. That we are succeeding, and that the fruit growers are beginning to place their fruit in the markets of our country more promptly, and in better shape and condition, is, I think, manifest to any observing person who has watched the trend of trade in the last few years. Our western country has opened up almost faster than we can take care of it, and it is only necessary to get suitable transportation facilities for that vast country to enable us to control that market and hold it for ourselves for all time to come.

I commend the report which I have just read to your careful consideration, and trust that there will be a full discussion on this very important and vital question. Mr. Chairman, I have pleasure in moving the adoption of this report.

THE PRESIDENT: You have heard the report read, and it is now open for discussion. The transportation question is a very important one. Whilst we have had very many questions of late years, we are hoping to have more. One thing which has been pointed out is that whilst we have the rate which we receive to Winnipeg, Portage la Prairie and Brandon, it does not apply to other points. It is fourth class rate to these cities, but to the remaining country it is third class rate. We should impress upon the Commission that the fourth class rate on fruit should apply to all car-load lots to all points in the West.

A MEMBER: Would it not be a good thing in regard to this matter if the Committee on Transportation should itself make some move in this matter in the way of correspondence with the fruit growing people, with a view to taking this matter up and putting it in the hands of three or four men, and in that way the fruit growing people will take a personal interest in this matter, and I think we will then be more active. I think by taking the matter up in that way it will have more force before the Railway Committee.

A MEMBER: May I ask in what relation we stand in connection with the express companies?

THE PRESIDENT: It is rather unfortunate, we have been asking the Commission to give us a number of concessions, but so far the Commission has practically done nothing; it has been standing still, waiting. Mr. Bunting is in closer touch with them, but I think that we certainly should impress upon them the necessity of taking steps at once.

A MEMBER: The rates are not equal between points in this Province. For instance, they will carry a basket of cherries from Peterboro for 16 cents, and they will charge from where I live 25 cents. I think they should be obliged to make the rates more equal. Of course there is an inducement where they are getting a large quantity to make a reduction, but I think that where they have a quantity less than a carload of grapes they ought to give everyone the same chance. The difference between 16 cents and 25 cents is a large one for practically the same market.

MR. BUNTING: As far as I know no new rules have been put up during the summer. The summer holidays came on shortly after that, and I know the Railway Commission have been overburdened with business, and in all probability this matter being such a large question, has been left for more mature consideration; but so far as I know at the present time no orders have been passed in this matter, and it is still open for us to press our contentions and reinforce them as fully as we may be able to. I think it is quite in the realm of possibility for us to strengthen our case at the present day very materially in connection with this matter. When it is once settled, it will remain so for a long time to come.

I have in my hand a letter from Mr. R. J. Graham, Belleville, and with your permission I will read it:

"In reference to transportation. There are special facilities in effect for apples exported that do not aply to apples shipped west. I presume this also applies to other fruits, but we think the Railroad Commission or the Government might well take this matter up, as the western market is just as important to the producers in Ontario, Nova Scotia and British Columbia as the export market, and we think the people in Manitoba, Saskatchewan and Alberta are entitled to some consideration from them. For instance, on export apples the icing charges are paid by the Government, while western shipments have to be paid by the consumer.

"On export business there are special stop-over facilities for forty-eight hours for inspection and re-shipments. This does not apply to western shipments, and our friends in the west are particularly anxious to buy cars with an assortment of varieties that suit the needs of their customers. To do this it is necessary to assemble the fruit at some

one point to load these specific cars with the exact varieties and grades required, and we have to pay the local inward freight and the through rate out. Where the apples originate on the same line that forward them we are allowed 33⅓% of the inward charges on proof of re-shipment. It would certainly be a great advantage, not only to the shipper, but the consignee as well, if this special stop-over forty-eight hour arrangement were put in effect on apples going west as well as for export."

REPORT OF CO-OPERATIVE COMMITTEE.

By Jas. E. Johnson, Simcoe.

As usual, a number of meetings of this committee were held during the year, the first at Guelph College during the short course in fruit growing. The main points discussed there were the incorporation of co-operative associations and the organization of local fruit growers' associations. The Assistant Provincial Secretary was in attendance and cleared up many of the points in doubt in regard to the taking out of the charters.

The next important meeting of the committee was held on September 7th at the Exhibition grounds. In addition to the members of the Co-operative committee, representatives were present from a number of the co-operative associations, and the discussions which followed were largely along the line of selling the associations' crop, prices were suggested, and a report was sent out to all of the organizations giving the range of prices as thought right for this year. These were as follows:

Fall varieties, $2 seconds, and $2.50 firsts; Winter varieties $2.50 seconds and $3 firsts.

The matter of incorporation of associations was again discussed, and owing to a change of officials in the Provincial Secretary's Department, it was decided to again discuss with them the rate of fees, powers, etc., of the associations. This was left in the hands of a special committee.

During the year some five of the associations were organized, and it is to be hoped that the prices realized for this year's crop will stimulate organization in other sections. There is no doubt that this year the demand was such as to have taken the crop from twice as many associations as are at present organized.

The Ontario Department was asked to appoint two inspectors for this year's inspection of barrel packing, but we understand that owing to the lateness in making the appointment only one man could act.

A resolution was sent to the Dominion Department urging more strict inspection in the neighborhood of co-operative associations. The Minister of Agriculture, however, stated that as this would be discrimination in favor of those districts, he could not see his way clear to give any orders to this effect.

REPORT OF NEW FRUITS COMMITTEE.

By W. T. Macoun, Central Experimental Farm, Ottawa.

Comparatively few seedings of merit were sent to the New Fruits Committee for examination this year, but descriptions follow of those thought worth recording in this Report. Other matter relating to new fruits is also included.

Apples.

The following varieties were sent to Prof. J. W. Crow, O.A.C., Guelph, Ont.:

Bishop, Mr., Guelph, Ont., Seedling from: Medium size; oblong conical; cavity medium depth and width; stem short, moderately stout; basin deep, medium

width; calyx open; yellow; predominant color yellow; seeds medium; dots moderately numerous, grey, distinct; skin thin, moderately tender; flesh yellowish, tender, juicy buttery; core above medium size, open; subacid, pleasant flavor; quality good; season evidently November and December.

Said to be a seedling of Bellflower, and better in quality than parent. It is good in quality and perhaps better than Bellflower, but too much like it to make it promising for propagation as a new sort. Worthy of further test. Described by W. T. M., Nov. 20th., 1909.

Woodhouse, J., Guelph, Ont., Seedling from: Above medium size; roundish; cavity medium depth and width, russeted; stem short, stout; basin medium depth and width, smooth; calyx open; yellow well washed with orange, red on sunny side; predominant color yellow; seeds large; dots moderately numerous, yellow, distinct on sunny side; skin moderately thick, tough; flesh yellowish, tender, moderately juicy; core medium; subacid, pleasant flavor; quality good; season evidently October and November.

Tree 10 years old. Bearing 3 years. Resembles Holland Pippin considerably. Handsome and rather promising. Specimens received from J. W. Crow, Guelph, Ont; described by W. T. M., Nov. 20th., 1909.

Woodhouse, J., Guelph, Ont., Seedling from: Medium size; roundish; cavity deep, medium width, russeted; stem short, slender; basin medium depth and width, wrinkled; calyx partly open; green washed with dull bronzy red on sunny side; predominant color green; dots moderately numerous, grey, distinct; skin thick, tough; flesh yellowish, moderately juicy, tender; core medium size, open; subacid, pleasant flavor; quality above medium to good; season evidently late November to probably through the winter.

Tree said to be twelve years old. Has been bearing five years. Parentage not known. Said to be a late keeping apple of fine quality. Not as good as Greening, which it resembles a little. Specimens received from J. W. Crow, Guelph, Ont., described by W. T. M., Nov. 20th., 1909.

The Ottawa Horticultural Society offered a $50 prize this year to "the person who originates in the Ottawa Valley a seedling apple hardy enough for the Ottawa Valley, that shall be certified by the Fruit Committee of the Ontario Fruit Growers' Association as a desirable apple, and one worthy of propagation."

Two varieties were sent to Mr. J. F. Watson, Secretary of the Ottawa Horticultural Society, and forwarded by him to Toronto, where they were examined by the Fruit Committee. Following is the report upon them:

Graham, Thos., Wyman, Que., Seedling from: Medium size; roundish; cavity medium depth and width; stem long, slender; basin medium depth and width, slightly wrinkled; calyx partly open; yellow splashed and streaked with bright red; predominant color bright red; dots obscure; skin moderately thick, tough; flesh white, faintly tinged with red near skin, tender, juicy; subacid, pleasant but not high flavor; quality above medium to good. Season probably October.

Tree found in a field and not noticed until three years ago. This is the first year there have been many apples—about half a barrel.

An attractive looking apple, but not good enough in quality nor a good enough keeper. Evidently about the same season as Wealthy. Specimens received from Thos. Graham, for competition for prize of $50, offered by the Ottawa Horticultural Society. Described by W. T. M., Oct. 16th, 1909.

Loney, Wm. R., Kenmore, Ont., Seedling from: Medium to above medium size; oblate flattened; cavity deep, open, heavily russeted, the russet spreading much beyond cavity; stem medium length, slender: basin open, shallow, nearly smooth; calyx partly open; pale greenish yellow, sometimes with a trace of pinkish red on sunny side; predominant color pale greenish yellow; seeds medium; dots moderately numerous, russet, conspicuous; bloom none; skin moderately thick, moderately tender; flesh white and yellowish, firm, crisp, juicy; core below medium size: subacid, sprightly, slightly astringent; quality above medium; season evidently late November to probably through the winter.

Said to have been produced from a large, red streaked apple brought from Ottawa some 15 years ago. Said to be bearing fairly "good" every year. Not attractive in appearance. Russet disfigures apple. Not good enough in quality. Entered for $50 prize offered by the Ottawa Horticultural Society. Specimens received from J. F. Watson; described by W. T. M., Nov. 22nd., 1909.

Mr. H. S. Peart, Horticultural Experiment Station, Jordan Harbor, Ont., secured a promising seedling apple by offering a prize at the Beamsville Fair.

Seedling sent to H. S. Peart: Origin, chance seedling on farm of Ed. Boughner, Beamsville, Ont.; tree upright, vigorous; fruit medium, roundish oblate, skin waxy light yellow, splashed and marbled with bright scarlet, stem short one-half to three-quarter inch long in a moderately narrow, deep cavity; calyx open in a moderately narrow and shallow basin. Flesh white, juicy and crisp. Quality, good for dessert, excellent for cooking. Season, late September and October to follow Gravenstein. Described by H. S. P.

The following varieties of apples were received at the Experimental Farm, Ottawa:

Crown: Medium size; roundish conic; cavity deep, medium width, russeted; stem short to medium, stout; basin deep, medium width; calyx partly open; yellow well washed with crimson; predominant color crimson; seeds medium size, deep brown, numerous; dots few, small, yellow, indistinct; skin moderately thick, moderately tender; flesh markedly yellow, crisp, tender, juicy; core medium size; subacid, sprightly, good flavor, somewhat like Northern Spy; good quality; season evidently mid to late winter.

Has grown up under a Northern Spy tree. Evidently a seedling of Northern Spy. Promising, although yellow flesh is not very attractive. Said to be higher colored than Northern Spy, but is not so good in quality. Specimens received from T. H. Wootton, Wellman's Corners, Ont.

Peart, Edwin, Nelson, Ont., Seedling Apple named "Homestead" from: Fruit large; roundish conical, ribbed; cavity open, deep, russeted at base; stem medium length, moderately stout; basin deep, medium width, nearly smooth; calyx open; yellow, washed and splashed with pinkish red and carmine; predominant color carmine; seeds medium size, plump; dots few, small, white, distinct; skin moderately thick, tough; flesh yellowish, tender, melting, juicy; core medium; subacid, pleasant flavor, but after-taste peculiar; quality good; season evidently early to mid winter;

Very much like Northern Spy in outward appearance, in flesh, and slightly in flavor, but general flavor is different from Spy; after-taste not altogether pleasant. Probably a seedling of Spy. Grown on farm of Edwin Peart, Nelson, Ont., and fruited for first time this year.

Specimens received from Edwin Peart, described by W. T. M., Dec. 3rd., 1909. Promising.

Grant, H. N., Newtonbrook, Ont., Seedling from: Above medium size; roundish, conic; cavity open, medium depth; stem short, stout; basin medium width, shallow, wrinkled; calyx partly open; yellow with a trace of pink on sunny side; dots numerous, green, indistinct; skin moderately thick, moderately tender; flesh yellowish, tender, juicy; core medium; subacid, pleasant flavor; quality good; season November, probably to January.

A good dessert apple, but not specially attractive in outward appearance.

Two seedlings originated at the Experimental Farm are quite promising.

Cromer (Swayzie Seedling): Above medium size; roundish, angular; cavity medium depth and width; stem short, stout; basin medium depth and width, slightly wrinkled; calyx open; green, thinly washed with pinkish red over most of surface; dots few, grey, distinct; skin thick, tough; flesh yellowish, firm, crisp, moderately juicy; subacid, pleasant, spicy flavor; quality good to very good; season late winter.

Does not resemble Swayzie except somewhat in spicy flavor. Of Ribston type.

Melba (McIntosh Seedling): Above medium to large; roundish, slightly angular; cavity medium depth and width; stem short, stout; basin deep, medium width, wrinkled; calyx open; pale yellow well washed and splashed with bright crimson; dots few, white, indistinct; bloom slight, bluish; skin moderately thick, moderately tough; flesh white, tender, crisp, juicy, perfumed; core medium; briskly subacid, pleasant, slightly aromatic flavor; good quality; season early to mid September.

A handsome apple of good quality. Resembles McIntosh somewhat about cavity, also in character of flesh and perfume and in aromatic flavor. May prove useful as following Duchess.

About 500 new seedling apples have been fruited at the Experimental Farm, Ottawa, during the past four years, of which 127 have had so many good points about them that they have been thought worthy of propagation for further test. Of these, 22 of special promise have been named.

It is interesting to note the relative proportion of promising seedlings from the different parent varieties. Following are the figures:

	Number of Seedlings Propagated	Percentage Propagated of those which have Fruited.
McIntosh	12	55
Northern Spy	4	44
Langford Beauty	12	40
Golden Russet	3	33
Wealthy	34	32
Fameuse	6	27
Swayzie Pomme Grise	22	27
Winter St. Lawrence	6	27
Scott Winter	5	24
Salome	9	22
Shiawassee Beauty	5	16
Lawver	2	16
Gano	3	10
Total propagated	127	
Percentage propagated of those which have fruited		28.69

A large number of seedlings and cross-bred fruits are expected to fruit at the Experimental Farm each year, from which there should come some very good varieties.

Plums.

Kingston Sugar Plum: Fruit received from R. A. Marrison, Cataraqui, Ont. Heart-shaped; above medium size, 1½ by 1½ ins.; cavity shallow, medium width; stem medium length, moderately stout; suture a distinct line, very slightly depressed; apex rounded; green, with traces of yellow; dots indistinct; bloom moderately bluish; skin moderately thick, moderately tough; flesh yellowish green, juicy; stone medium size, oval, cling; sweet, good flavor; quality very good.

Said to be hardier than Lombard and some other sorts. A promising plum. Described by W. T. M., September 11th, 1909. Reine Claude Group.

Omaha: From C. E. F. Roundish, almost round; as large as largest Americana, 1½ by 1½ ins.; cavity narrow, medium depth; stem short, ⅝ in., moderately stout; suture an indistinct line, little, if any, depressed; apex rounded; yellow, entirely or almost entirely covered with attractive red; dots numerous, small, distinct; bloom bluish; skin moderately thick, tough; flesh yellow, juicy, tender; stone medium size, oval, cling; flavor sweet, good except next stone and skin, when acid; quality good except next skin.

Appears to be a blend of Americana and Japanese. Fruit has perfume of the Japanese. Foliage of tree somewhat like Japanese. Promising. Described by W. T. M., Aug. 18, 1908. Americana and Triflora Group.

Snow, C. H., Cummings Bridge, Ont., Seedling of Weaver: Oval, slightly flattened; large; cavity shallow, open; suture a distinct line, not depressed; apex rounded; yellow, more or less washed with red; dots indistinct; bloom thin, bluish; skin thick, moderately tender; flesh yellow, juicy; stone medium size, oval, flattened, cling; flavor sweet, not rich, good; quality good.

A large, attractive-looking plum of good quality. Promising. Would be more so if a freestone.

Described by W. T. M., Sept. 27th, 1909.

Yuteca (South Dakota, No. 8), (Director's Garden): Received from Dr. Saunders. Roundish; large; cavity medium width, shallow; stem long, slender; suture an indistinct line, not depressed; apex rounded; yellow almost covered with lively crimson; dots numerous, yellow, distinct; bloom moderate, bluish; skin thick, moderately tough; flesh yellow, firm, juicy; stone medium size, roundish, semi-cling; flavor sweet, rich; quality good. Americana group.

An attractive-looking plum of good quality. Rather promising. Described by W. T. M., Sept. 22nd, 1909.

No promising peach, pear or cherry seedlings were received by the Committee during the year.

Grapes.

A promising early, white grape of unknown parentage, originated at the Experimental Farm, Ottawa, has been called McTavish, of which the following is a description:

McTavish: Ripe September 23rd, 1908. Bunch below medium to small, broad, very compact, rarely slightly shouldered. Fruit medium size, roundish, pale green, slightly tinged with purple when exposed to sun; skin thick, tough; pulp tender but does not separate readily from seeds, which are rather large and usually three to a fruit; juicy, sweet, good flavor, slightly foxy. Quality good to very good. Productive. Owing to its earliness and good quality this should prove a useful grape in the north.

Bush Fruits.

The following notes on two seedling black currants were made by Prof. H. L. Hutt, O.A.C., Guelph, Ont.:

Black Currants: Seedling from Albert Hannam, Chalmers St., Galt, Ont.

"*Oldest Seedling*": Bush evidently very productive. Bunch large, mostly six berries to a bunch. Berries hang well to stem. Berry: Large as Black Victoria, fairly uniform in size; quality extra good. Berries sweet enough for good dessert fruit. Promising because of good quality and productiveness.

"*Newer Seedling*": Good, but not such high quality nor so promising.

COMMERCIAL PEACH ORCHARDING IN SOUTH-WESTERN ONTARIO.

By J. L. Hilborn, Leamington.

With such subjects as this, it is the present condition that is of chief interest to all, and as my time is limited I will allude to the past only enough to say that in Essex County the fruit buds of the peach tree usually come through the winter in good condition, so we almost always have plenty of good buds to produce a crop.

As most of you are aware, our peach orchards in that district have been twice annihilated in ten years, by the winter killing of the roots of the trees, to such an extent that several thousands of acres of peach trees were entirely destroyed in that way, while a good share of the fruit buds and the tops of the trees were apparently uninjured. So far as I can learn this never occurred before, except once some thirty years ago, and then the destruction was not nearly so complete.

Therefore I consider it is fair to assume that with the improved methods of culture and the more general use of cover crops the chances are that those who are now planting peach orchards have a fair chance of harvesting good crops.

As so many of the growers lost so heavily by the destruction of all their orchards on the two occasions I have mentioned, most of them entirely ceased planting peaches for several years and gave their attention to the growing of other crops.

Just a few of the more optimistic ones continued planting to some extent, and those have been harvesting fine crops the past two seasons. But the acreage of bearing orchards is still quite limited in Essex County. There are perhaps only one hundred and seventy or one hundred and eighty acres in bearing in what might be called the Leamington district, including the Albuna and Olinda locations, and I know of no large orchards outside of this territory in the county. There are perhaps eighty to one hundred acres more just coming into bearing. The greater portion of these orchards are being well cared for, in pruning, spraying and cultivation and are in good condition to produce a crop next season. The San José Scale is quite bad all through this district but is being fairly well held in check.

There were probably twenty-five thousand more peach trees planted in this vicinity last spring, and so far as I can judge from extensive enquiries, there will likely be as many more planted in the spring of 1910, while numerous others are planning to heavily plant the following season. It will take several years yet, however, to get the acreage of peaches that we had in this vicinity previous to the disastrous freeze of 1899, but the great majority of trees that were destroyed at that time were not old enough to have produced fruit to any extent.

While it is apart from the subject, it might be of interest to note that scarcely any tree fruits are being planted in this vicinity except the peach.

Farther west along the shore some peaches are being planted, but to no great extent.

The varieties that are being planted mostly are: *St. John, Engle, Alberta, Banner, Golden Drop* and *New Prolific.*

For the consolation of my Canadian nurserymen friends I might state that while quite a few of the trees being planted are grown locally and some are purchased from nurseries in the Niagara district, the greater portion of them are imported from nurserymen in Michigan. The chief cause of this condition of affairs is the fact that a few years ago quite a large quantity of trees were purchased from nurseries in the Niagara district, which proved so very unsatisfactory that our growers got the idea that our eastern nurserymen thought that anything that looked like a peach tree was good enough to send to Leamington.

The past two or three years, however, some of my neighbors and myself have been getting some trees from near Fonthill which have been very satisfactory. If you will continue to send this class of trees you will possibly win this trade back again, if it is not supplied locally, which is quite probable.

In Lambton County, particularly along Lake Huron shore, north of Forest, the people are becoming quite enthusiastic over the growing of peaches.

Mr. D. Johnson, of Forest, who is well known as one of the leading fruit growers of Western Ontario, has an orchard of fifteen acres just coming into good bearing, and he intends planting ten acres more next spring.

Mr. Johnson informs me that several of his neighbors have peach orchards that are producing heavy crops annually—that there are over one hundred acres of peach orchard in that locality, about half of which has been in bearing for several years, the balance just coming into bearing. He states that in all probability there will be about one hundred acres more planted next spring with heavy succeeding plantings.

Mr. Johnson is very optimistic regarding the peach industry for that vicinity, and I think he has good reasons to be. As that is my native county I am quite familiar with the conditions there, and I consider peach growing in his immediate neighborhood should be very successful.

At Arkona, twelve miles inland, they are also growing peaches to a limited extent. Mr. E. D. Morningstar has about ten acres in bearing, also a young orchard, while several others have smaller orchards. However, the crops there are more uncertain than along the lake and it is unlikely that enough will ever be grown there to materially affect the market.

In the county of Kent, particularly along the lake shore, there is a tract of land that is well adapted to peach growing. A few are being grown there, but so far as I am aware they are not planting very extensively as yet.

FIFTY YEARS' PEACH CULTURE IN ONTARIO.

By A. M. Smith, Port Dalhousie.

May I be allowed before commencing the subject assigned me to say a few words upon fruit culture in general and the good it has accomplished for our country during the last 50 years. I do not think there is anyone here but will admit that the fruit industry has done more in building up the prosperity of our

country than any industry we have. It has done more to attract immigration from other countries, by showing we have a climate that could produce such a variety of choice fruits. It has made us all healthier and happier and contented to have such a bountiful supply of fruits to enjoy. It has shown the world that Canada can produce fruits that cannot be excelled or equalled (particularly apples) in any country in the world. What has been the greatest factor in establishing this industry and bringing it to its present value to the country? I answer without fear of contradiction, The Ontario Fruit Growers' Association, the fiftieth anniversary of which we are now celebrating. This Association has done more to establish and maintain this industry which makes Ontario the banner Province of this great Dominion (if not of the great British Empire) than all other influences combined. Its members have taken the lead in introducing new fruits adapted to the different localities, in encouraging their cultivation, in opening up markets and establishing transportation facilities, in short, making fruit growing a success.

But to turn to the subject assigned me, "Fifty Years of Peach Culture," fifty years seems a long time if you are looking ahead, but if you are looking back over the past, not so long. Fifty years ago commercial peach growing was almost unknown in Canada. Many farmers in the peach belt grew peaches for their own use and sometimes sold them to settlers in the back townships or to hucksters who came out from cities and towns and oftener fed them to their pigs, but the idea of growing them for profit or market was not thought of. Some of our cities and towns were partially supplied with this fruit, but it came mostly from the States. Fifty-seven years ago I was working for a man who had the largest peach orchard then in western New York, and he sold most of his fruit in Canada, and I sold his peaches for him in Woodstock, Ingersoll and London up to fifty years ago, when my own orchard began to bear at Grimsby.

The first peaches of which we have any record were planted along the Niagara River below Queenston by James Durham in 1825, on the farm now owned by C. E. Fisher, where there is now one of the finest orchards in the country. Another, I am told, was planted about 1830 by Geo. Stevens, a retired army officer, on the farm which is now owned by our celebrated peach grower, Wm. Armstrong, which shows that soil planted and used for peaches for nearly a century does not deteriorate or lose its value if properly cultivated. Other small orchards were planted in the vicinity of St. David's by the Woodruffs and others. But I think the real first commercial orchard was planted by Joseph and John Brown about fifty years ago on the river below Queenston. Since then there have been numerous orchards scattered through the township. The Vroomans, Bradley and others in the southern part, Major Hiscott, the Balls, and others in the northern, have planted largely until to-day there is estimated to be 200,000 peach trees growing in the township and the present year's shipment not less than 400,000 baskets.

Grimsby, which has been considered in the past the great peach centre, had no commercial orchard until the late Charles Woolverton and myself planted about five acres in 1856. Many of the old farmers in the neighborhood (whose sons and grandsons are now shipping peaches by the carload) wondered what we would do with them when they began to bear, and prophesied our venture would be a failure, but we cultivated our trees and got the express company to establish an office at Grimsby, and just about fifty years ago began shipping our fruit to parties we had formerly supplied from the States. Others seeing there was a demand for peaches began to plant. Jacob Kitchen and John Nixon were among the first who planted on a small scale, but it was ten or twelve years before the fever began to

spread and larger orchards were planted on the east and west of us—the Carpenters on the west, John Kilborne and others east, about Beamsville. About 1870 C. M. Honsberger planted a small orchard at Jordan Station, and he informs me that there is now no less than 500 acres planted in that vicinity. Thirty years ago there were very few peaches growing in Louth or Grantham. J Broderick, in Louth, and E. McArdle, in Grantham, had some of the first commercial orchards. The present year there has likely been more shipped from these townships than any others in the country. Mr. Bunting will likely be able to give you the figures.

We used to think that Saltfleet, about Winona, had too hard a soil to grow peaches, but I am informed that J. W. Smith & Sons have picked 33,000 baskets this year from 40 acres; J. C. Henry, 15,000 baskets from 20 acres, and others had similar yields in that section and at Grimsby.

Morris, Stone & Wellington planted the first commercial orchard in Pelham, about three acres, and one season they realized $2,900 from it. Stamford had a few orchards as early as 1865 along Lundy's Lane and vicinity, planted by the Corwins and Biggars, and later on there were larger ones in the northern part. A Mr. Dunning and Mr. Thos. Berryman were planters.

I have mentioned the principal peach growing districts, but there were quite a number grown outside, some about Barton, Hamilton and Burlington, besides the Lake Erie district which we have heard from by Mr. Hilborn.

In regard to varieties: Although there have been many new ones introduced and tested in the last fifty years, there has been nothing to excel the old Early Crawford. This, with Old Mixon Free, Early Purple, Barnard, Jaques' Rare Ripe, Honest John and Crawford Late, were planted in our first orchard. Later on came Hales Early, Alexander, Rivers, Foster and a host of others. It is well known that many varieties succeed better in certain localities and soils than in others. I think the Experimental Board in one of their reports has given lists adapted to different localities. If you have not all got them, you should do so.

In regard to insects, we knew little about them in early days, excepting the borer in the roots. We dug them out, and as a preventive, and also to protect our trees from mice, we would mound up our trees six to eight inches in the fall and leave the dirt there till the insect which produced the grub or borer had deposited its eggs (which were laid in the tree at the edge of ground early in the season) and then haul it away, which would leave eggs exposed to the birds and weather and make them more easily destroyed. The next and most serious insect pest was the San José Scale, with which you are all too well acquainted.

Diseases. The yellows has been the most serious disease we have had to contend with. It was introduced to us about 35 years ago. My first experience with it was in the township of Stamford, where I had planted an orchard and was also growing trees for sale. A friend of mine near Lockport, N.J., wrote me he had found a new peach similar to Early Crawford, but two weeks earlier and high colored. He advised me to get some buds and propagate it. I drove thirty miles to see it and found it was an Early Crawford I had sold to the owner several years before. I had heard enough about the yellows to know what it was, so did not propagate. I know of several who did propagate from infected trees thinking they had found something new and valuable and thus helped to spread the disease. This and its kindred disease, Little Peach, has been discussed at your former meetings, and I will not trespass on your time with it further than to say, "Cut it out."

Now about the next fifty years of peach growing in Ontario, will there be as much progress as in the past? We have a great country rapidly developing and filling up with people who love fruit and consider it a necessity. Soon we shall have millions to supply. Only a small portion of our vast Dominion is adapted to fruit growing, especially peaches. Shall we, on this little, narrow peninsula, be able to supply the demand? Is there any danger of overstocking the market? I leave this question with you and future growers to decide.

After the reading of this paper, Mr. Smith was presented with an illuminated address by Mr. Murray Pettit, accompanied by some very eulogistic remarks by himself and other members of the Association, to which Mr. Smith replied as follows: "I hardly know how to express my feelings and thanks for this kind address and my appreciation of it. If I have been of any use to the country, I am glad of it; and if I have had a part in building up this great Ontario of ours, I feel proud that I have been a little help in that direction. I thank you all for your kind expressions, and I hope we will all be long spared to further this great industry of fruit growing, which has done and is doing so much for our country."

PRUNING THE PEACH.

By J. W. Smith, Winona.

There is one feature which has always impressed me and continues to do so to a greater degree every year that I live. It is that the greatest and most valuable information is got by observation. When a man sees and observes, the knowledge he gains is far superior to anything he may read or hear, because it is through close observation that we are able to derive the greatest benefit from our studies, conventions and meetings. In my earliest days of fruit growing, I would travel as circumstances would permit in order to see what other men were doing, and if possible to get their reasons. These observations have been my most valuable assets in determinating and originating my ideas, and I owe to them the degree of success which I may have obtained; and right here I must urge on the young man the importance and value of close observation of the operations of the progressive growers, no matter where he may be located.

An idea which I would like to suggest to young men is to prune their trees in the summer so that they may make the buds hardier. It appears to me from what I have seen that there is a certain time of the year that if you could keep the formation of the buds back for two or three weeks that possibly they would go into the winter in a hardier state. I am not sure whether this is correct or not, but it is the idea on which I am working in order to see if I can discover anything. The question is asked what do we prune for? In reply some growers say because my neighbors are pruning; others say because some old peach grower prunes and we are following his example. We should have a reason for our methods of pruning.

I think that our pruning has been radically wrong heretofore. For instance, if we plant a peach tree and allow it to grow, it will spread out, will grow higher and expand to a great degree, smothering vegetation weaker than itself and occupying all the ground. If we prune our peaches too high it is harder to keep the ground clean. My idea, and the one on which I am working, is to keep the tree down. You will see by this photo that I can pick every peach in this orchard while

standing on the ground. This orchard was planted four years ago last spring, and we have picked an average of five baskets to the tree. They ran nearly all first grade peaches amongst them. There are 160 trees to the acre, which would make 800 baskets per acre, and I consider this a good crop.

When we used our heads from four or five feet from the ground the branches would be very high, and as the tree attained a good size and would leaf out in the spring we thought we were going to get a fine crop, but in three weeks in the centre of the tree the leaves would turn yellow and drop. I began to study this and I came to the conclusion that the cause was a lack of sunlight and I have proved that you must get the sun into the centre of the tree in order to get hardy or healthy wood. You must get a leaf first before the fruit bud will form, and if you do not get healthy foliage you will not get the buds, and naturally the fruit. Start your heads as low as possible, prune properly and you will find that you will get first class peaches from the lower branches as well as the upper, and that the picking of the fruit is very much easier.

I would like to say a word or two with regard to my plan of cultivating peaches. I do not plow as much as I used to. Our discs are gauged with rims so that they can cultivate about 2-2½ inches deep. Formerly when the discs were not gauged with rims they penetrated too deeply the soft ground and severed the roots, which I regard as very detrimental to the proper growth of the tree and maturing of fruit.

I do my plowing in the fall and plow up to the tree so as to afford drainage. My spring work is done as soon as the soil is fit, but my cultivation is as shallow as possible.

Mr. Smith illustrated his remarks by photographs from his peach orchard.

Q.—How deep would you go?

A.—Not over three inches and don't think it necessary to go deeper than two inches. You want to protect the root fibres as much as possible.

Mr. Wm. Armstrong: There are several good reasons why a low-headed peach tree is best. First, it will increase the annual cash profit on account of a larger percentage of first class fruit; second, it will add at least five years to its life; third, minimum damage on account of broken limbs caused by wind, snow or heavy crop; fourth, the fruit can be picked by a man standing on the ground, thus saving in time and ladders; fifth, the damage caused by fallen fruit will be light; sixth, the expense for spraying material and labor will be reduced about one-third. In order to start this kind of tree the peach grower must insist in getting his baby trees from the nursery rows, not the slim five to six feet kind, but the three to four feet short stocky kind.

PRACTICAL PRINCIPLES FOR PROFITABLE PEACH PRODUCTION.

By C. E. Bassett, Fennville, Michigan.

I desire to touch upon some of the high spots in modern peach culture methods. The idea of the commercial side of the question in Michigan as well as in Ontario, is to produce, if possible, the largest number of bushels of the largest size fruit of the highest quality, and to produce the crop in such a way that it will give the greatest pleasure to the consumers of that crop. That I take it is our commercial object, and in these remarks which I shall make I will attempt to

cover some of the points which will accomplish these objects which we have in view. We desire the largest number of bushels. We want quantity because it is from quantity we expect money, but we must have these bushels of large size fruits, and they must be high-colored fruits, because I presume the people who buy our fruits will judge largely of that fruit by its size. They look for a large fruit, a fruit of high color, which is attractive, and to a large extent, I am sorry to say, they have little, if any, knowledge of the quality of the fruit. That, possibly, is more or less a matter of producing fruits of quality, and though I do not want to make any point upon that and discuss it, because it is another question, still I believe it is important that you and I should take into consideration the likelihood of producing fruits of poorer quality upon the future of an industry in which we have to trade. If a man or woman buy something which is a poor quality, or a bad taste when they put it in their mouths, it takes some little time to get that taste out of their mouths, and it is some time before they will want any more of the same article; whereas, if you give them something which is of high quality, which gives them such a delicious experience as to require more, you have increased the consumption of your products.

Now, what are the absolute essentials in producing the desired results? I might say, first of all, that as the apple is considered the king of fruits, so we delight to call the peach the queen of fruits. Now how shall we get large quantities of peaches? True, it must come, not necessarily from numbers of peaches, because if you look for numbers you will not get size, and you must get color. If you do not get this you simply fall down. Now these gentlemen have shown you very nicely the style of pruning, and that is one of the big problems, one of the essential problems, and one which I intended to touch upon. But they have so fully and perfectly covered these questions according to my views that I have nothing to say except to simply coincide with what they have said.

Why is it that we have such beautiful fruits? This is just as much an apple-growing country as a peach-growing country. Why is it that in your far western section they produce these beautiful apples, and why do we in Washington and Wyoming produce such beautiful apples? There is no more sunshine there than here. The air is freer from moisture. They have to irrigate. They have no great amount of rain-fall, and so their air is completely devoid of water, and they have no muggy, foggy days, and the result is they get the sunlight which has its effect in the color of the fruits, and which gives them a very high color. Are you and I going to get that western production? We can go a little nearer to it, if we can simply adopt the methods which have been presented here, by trimming up the tops of the trees, and letting in all the sunlight which it is possible to get. In the past our systems of horticulture have simply been systems of forestry, growing trees, not fruit. We thought we had to have monstrous great big forests in order to produce fruit. Our present methods of horticulture have to be altered. We must not only have the trees, but we must keep these trees in subjection. While we need leaves on the trees, still we do not want so many leaves that the sunlight cannot get down and color the fruit. So from the very foundation in our practice at home, we cut our trees very close to the ground, from twelve to twenty-four inches. We aim at having our trees about sixteen or eighteen inches. We will cut them a little bit lower, and possibly a little bit higher, but this is our aim. Our methods in Michigan are purely commercial. No waste time is spent unless we feel it is invested in that from which we will receive dollars and cents. We do not invest one dollar of time or money unless we feel we are going to get results.

In addition to color we want size. How are you going to get size? By holding the top in subjection, not allowing it to over-balance itself. Let me illustrate: Supposing you see a chance to use the boiler in an engine, and you need some power, and you should go to your machinist and say, "I want to get a good lot of power and I haven't much money." He would say, "How much power do you want," and you would say, "I want about 20 horse-power." "Well," he would say, "the engine will cost you so much." You will say, "Well, that's a little more than I expected to pay, I will have to economize on the boiler; I guess I won't buy more than a 10 horse-power boiler." He will say, "You are foolish to have a 20 horse-power engine, and a 10 horse-power boiler." You know, as a matter of fact, if there is a machinist in this room or an engineer, that the practice is to have the boiler larger than the engine. Your root system is the boiler, and your top is the engine. You cannot get any more power into that engine than there is in the boiler, and you cannot get any more power into the top of the tree than there is in the root. If you want to get large peaches hold them in subjection. I believe that nine-tenths of our troubles, and nine-tenths of the failures or lack of success is due to the fact that we have been growing too big crops, and have not looked to the root system to give the power. The peaches that are selling for the big money to-day are the large, high-colored peaches which come from a small top.

There are one or two points which have been touched upon in regard to the matter of pruning. I want to mention one point. There is a great waste of energy in this regard. There are parents in this room who have been blessed with the gift of children. When that little child was given to you you watched over it with all the care and tenderness that is possible. You saw that it would develop. The very first thing that develops that is wrong, or that would be liable to damage the character of the child or its growth, you take pains, and at that very moment you try to eliminate that bad point, don't you? These little trees are babies. When you see a bad thing starting out on that tree, that is in a place where it does not belong, the common practice is to pay no attention to it—let it go. Why don't you do that with your children? Why don't you say, "Of course we cannot bother to correct these things when they would injure the child." These are things which will leave great scars that will never heal. I believe you realize it as a fact as you take the baby child, so when you see the limb coming out that does not belong there it is simply a matter to lop it off, and no great scar is made.

A Member: How about the difference? If you do not secure a considerable amount of wood in branches you reduce the size of your trunk.

Mr. Bassett: Our trunks are plenty large enough. There is one thing that I would like to say in regard to this question of thinning as has been mentioned by some gentlemen this evening. You recognize that it is necessary in peaches. I wonder how many of you have practiced it in apples. Do you think it is just as essential? There is one orchard which some of you know about in which the apples were thinned just the same as you thin peaches, and out on that large orchard—it was all Baldwins—they ran better than 90 per cent of No. 1 apples, and they brought $3.65 a barrel, f.o.b. Fennville. Does it pay to thin? We know it pays to thin peaches, and I believe it is an important question as to whether we should thin apples. You say it is a hard proposition, but I am just submitting it for your consideration.

Now, in regard to the picking of apples: They have got to be picked. Does it make any difference whether you pick them early in the season? No; and as a matter of fact there is a great deal of work being done of that kind, and I want some of you who are in the apple trade to try it next year on one tree.

The matter of spraying has been a debatable question on several occasions. Your curly leaf you control the same as we do. Since we have been spraying we have found that it was a good remedy for that; there was not a hatful of curly leaves, and I am positive we did not lose a peach on account of curly leaf, and we simply use the one spraying of lime and sulphur, at the same time that we sprayed for the San José Scale. It was commercial lime and sulphur that we used this year.

There is one matter that has not been touched upon, I believe, here, and I may as well mention it, this matter of fertilizers. We have had no bad effects from the use of barn-yard manure for the simple reason that we did not have enough barn-yard manure to have much effect. The amount of fertilizer manufactured on our farms is small compared to the needs of the farm. We are using and have been using the ordinary fertilizing elements of the ground, or the acidulated bone and the muriate of potash. Our nitrogen we try to get from the use of cover crops. Some people use oats and barley and other different cover crops. The ones which are of most value and the ones which are most popular at the present time are the vetches, which have the advantage of being leguminous crops and very similar to clover. You can put them in in the spring and it makes a large amount of humus when turned under. The clovers are not suited to the peach orchard; it takes too long for the clover to make sufficient growth. If you leave it in the spring long enough you have damaged your crop, and that is one of the things you have got to look out for. You must absolutely get your growth in the spring, that is very important. Don't wait and say, "Oh, I can get my growth any time." You want to boom your growth from the start, and then stop it. When you want it to stop, you do it with a cover crop, and the time you put that cover crop in, just that minute you have a riper crop, because it takes up the moisture in the soil, it also takes up the available vitality that is in the soil, and saves it for future use.

PROFITS IN THE PEAR ORCHARD.

By W. F. W. Fisher, Burlington.

I had hoped from the programme which I saw that there would have been introduced the subject of pear growing by a review of the history of the pear during the past fifty years, the lifetime of the organization in which we are met here to-day, and it would have formed, I think, a very valuable basis for the few remarks I have to offer. But as my subject was set down and assigned to me "Profits in the Pear Orchard," I think the history of the pear, and the history of pear growing in this country, during these fifty years or more have thrown some light on the question as to whether there are or are not profits, and to what extent we may expect profits from the cultivation of the pear. I am aware that I am talking to some very extensive pear growers, and some growers of very much greater experience in pear-growing than myself. I hope that during the course of the morning I will be able to get information with regard to the pear after the subject has been introduced. I find in looking over the history of the cultivation of the pear, that during the life of this Association, between forty and fifty years, the pear was introduced to probably not as many sections of Ontario as it is in to-day. In some of the old settled portions they had tried the pear, but with very varying success both as to climate and varieties.

The history of the pear shows that there are a good many districts that are entirely unsuitable for pear growing from a commercial standpoint. I think it would be well for a person starting out to look for profit in the pear orchard to-day to see how pears have succeeded in his district. After we have found out from observation of this nature that pear growing is likely to be successful in our district, we have to look for a suitable location for a pear orchard, and that very largely resolves itself into a question of looking up a location just such as we would seek for an apple orchard.

It has been claimed that the pear is properly a clay or clay-loam fruit. I must say that some of the finest trees, and I think altogether the finest fruit that has come under my notice, has, generally speaking, been upon sandy land or sandy loam. The pear will do well on any well-drained soil, either with natural or artificial draining, that is, where other conditions are favorable to it. The drainage is a very important matter, I think, probably more so than we generally ascribe to the pear. From the fact that with some planters, in my own experience, at all events, it is desirable to plant the pears pretty deep, to plant our standard pears about six inches deeper than we do in the nursery, for this reason we require to have a pretty good depth of soil. Possibly some of the growers here will differ with me in that respect of deep planting.

If we have decided to plant a pear orchard, and have a suitable place to put it, the next question will be the varieties for commercial pear growing. I think it is desirable to keep the list of varieties within a pretty circumscribed limit, unless the person is going into pear growing on a very extensive scale, and is proposing to very largely handle the crop with the hired help he has about him on the farm. In that case he would try to extend the list of varieties fairly well and spread them over the season. I have found that an advantage both in apple growing and pear growing, where we handle our own fruit with the help we have about us on the farm. We have some three or four hundred summer apple trees, and find if we had that many more winter apple trees to handle in the fall we could not do it so well as we can by handling a proportion of them during the season as the time comes on. That would also apply to pear growing. In my judgment a person might start out in the season early for home markets with Wilder, Gifford, and Lawson, three summer varieties of pears, of moderate and saleable size, and acceptable to home markets.

Then we come, in my opinion, to the great Bartlett, which has, all through the history of the pear in Ontario, been described and known as a hardy pear, but which does not do well in the northern districts on account of the hard frosts. It is the greatest pear of its season, and the best pear we grow, take it all around, and at the same time covers a fairly long period. The Bartlett may be picked pretty green, and under proper conditions will ripen and sell to advantage. Again it may be picked at what we call the proper time for picking, and will keep a good while, or it may be left on the tree for two weeks later for particular home markets, and with very little loss. The loss in droppage is fully made up in the gain in appearance and in the size of the pears. If I were confining myself to a strictly commercial orchard, I would have left out these first three varieties, and gone to the Bartlett at once.

My next choice would be the Duchess, followed by the Bosc. We want some pears of later ripening than the Duchess, but the question as to what they will be is not, to my mind, very clearly established. The Diel, I think, is a pear that has been neglected. Now I would very strongly impress on any intending pear growers, in the cultivation of these, to grow varieties that are large and attractive

in appearance. There is no question about it, quality does not count with size and appearance on the market, no matter where the market is. It does not count right here in Toronto in the middle of our fruit-growing section, and where people are supposed to be more educated as to the merits of fruit. I think if you will ask the average house-wife in Toronto how she selects her apples when she goes to the grocer or the market, she will tell you that she always buys the red apples.

We want to grow a fairly large and attractive looking pear. However, size will outweigh attractiveness and appearance. There are a number of very large pears which have not been grown as far as my knowledge goes, in a large way, for instance, the Pitmaston and Souvenir.

Then we come to some pears that are not quite so large, but are better known. The Winter Nelis is a small pear, but on the British market the name is almost as important as the size and appearance, because the Britisher, no matter where he has been situated, if he has become accustomed to a variety of fruit, will buy it under that name, and it will take a long time to switch him off on to a better variety of some other name. The Comice and the Nelis are names that are well known to the British market. If these pears will do well in a locality, I think it would be wise to plant them to a limited extent; but I would advise persons who are planting pear orchards for profit to go very largely on Bartlett and Duchess. The Duchess is a blight resister, but in my experience does not do well as a standard. I would very well like, when talking about varieties, to hear from some of those in the audience regarding their opinion of my choice of varieties, and their experience with the different varieties.

Q.—How does the Sheldon do?

A.—I have never known the Sheldon to do well enough to recommend it. We have Sheldon trees, and there are a good many of them in our neighborhood. In my own orchard there are about fifteen trees. They are trees of twenty years of age. They have not blighted. They have been rather long in coming into bearing, and have dropped their fruit very early. I would not pass by the Sheldon for any variety I have ever had for a dessert pear. In my opinion it is very much superior to the Seckel, which is considered to be the standard of excellence as a dessert pear, but I would never recommend the Sheldon as a commercial pear.

Q.—How about the Clairgeau?

A.—That is a pear with a great deal to recommend it, of good size and appearance, and I think a profitable one. In adding to the list it would be quite safe to add the Clairgeau.

Q.—Would you use that as a standard?

A.—I have never seen it as a dwarf pear, but I understand it does well on dwarf stock. I only know of one orchard of it, and the people are liking them, but the quality is not good enough to recommend it for very extensive growing.

A MEMBER: I might say that I have a tree that is doing very well, but it did not succeed on a dwarf stock.

MR. FISHER: There is another pear that I think is of much merit, and that is the Howell. In adding to the list I would certainly plant the Howell in preference to Clairgeau. It is a pear of high quality, and possibly as good in other points except in size.

Q.—What about the Clapp?

A.—I have some in my orchard. I find nothing that will compare with them. This year they sold for more money than the Bartletts did in the local market. The buyers pay more money for Clapps than they would for Bartletts all through the season. The trees are short-lived and with me they do not bear as early as the Bartletts.

Q.—Has the nature of the soil anything to do with the Clapp?

A.—When you get a Clapp, or any other pear tree, past twenty years it is fairly immune from blight from that on. The trouble is getting it up to that stage. The question is whether the soil affects the blight on the tree. I think it does indirectly in this way: soil that is conducive to very rapid succulent growth, the wood and foliage of pears planted on that land would not be blight resisting. The reverse would apply to land that did not grow the trees quite so fast. But we have some Clapp trees that will probably get past the blight stage, and may become permanent trees, but they will be very few. If I were planting pears in any number I would not plant Clapp.

Q.—In speaking to a canning factory man the other day about the different varieties of pears, he said, "Cut out the Kieffers," and in less than six weeks or two months afterwards he himself gave an order for one thousand Kieffer trees and planted them out. I want to know why the change was made.

A.—I am a grower of Kieffer trees, and I have followed the history of them all the way through, and certainly I do not call it a first-class dessert pear. This is not maligning the pear, for I do think the Kieffer really has merit as a canner. I am not ashamed to say that in our home we use a good many of them prepared in this way. They allow the fruit to steam for a considerable time in the cooking and the canned fruit compares very favorably with other varieties.

A Member: The tendency of the canning business has been, in regard to the English market, that no matter what brand of pear was put up, the English market would not buy the Kieffer pear, but that if they put up the Bartlett pear they could sell it at a good profit.

The President: I do not know anything about that feature of it, but if canners can get good Bartletts they do not need Kieffers. But in a year like this, when there is a very small crop and not enough to go around, they have got to take something, and a Kieffer, if it is well and properly ripened, well-grown, of fair size, will can very well.

Mr. Fisher: I think we have given the Kieffer all the merit it deserves, and if anyone would like to discuss any other varieties we might do so now.

The President: Have you had experience with the Pitmaston Duchess?

Mr. Fisher: No, I have not had experience with it. A large-growing pear appeals to me very strongly. The French people have been in the habit of putting a good many pears on the British markets at enormous prices, and they are practically all big pears. They put on a great lot of very large pears at prices that we never dream about, pears that will grow large like the Souvenir and the Comice. I think they are worthy of trying in a more extended way in our commercial orchards.

Q.—Would you recommend planting the Wilder as a good pear?

A.—Not in a commercial way. It is about the size of the Kieffer and hardly as big as the Lawson. I like the Lawson the best of any of these small pears if it is picked green.

Q.—Is the Lawson better than the Kieffer?

A.—Not in quality.

Q.—Commercially?

A.—I think it is a little better on the market than the Giffard. It is a little larger and a little harder.

Q.—It will not stand up very well?

A.—If it is picked green. That is what we always heard about the Clapp, that it won't stand up very long, but we have really never had any better price in the Old Country than for Clapps. If picked at the proper stage they will hold up and they will stand shipping very well.

Probably we are not getting very close to the question of profit, but all these things have their bearing eventually when we go into the profits, because I do not think it is the proper thing for a person to say they have two or three good crops of pears and make a good deal of money out of them. We get at the profits in pear growing by going through the different stages, meeting with our reverses, and aggregating our expenses, and so on.

The question of the distance to plant may possibly be another question in commercial pear growing. There is also the question of the cost of production, that is the value of the land on which we put our pear trees: that enters into it too.

Q.—Just speaking in a general way in regard to the land we would want to plant pear trees on, say it was worth $300 an acre taking it any place in the Province, and if that is the case you want to make full use of your land.

A.—I am not in favor of the new school of big spaces in either apple or pear orchards. I am in favor of very hard pruning, and not a wide planting, and in making the trees conform to the conditions you want to work under. I would not plant standard pear trees at a distance of more than 15 or 16 feet apart each way, and the dwarf pear trees I should say from 10 to 12 feet in order to give them 12 feet both ways.

Q.—How high would you let dwarfs grow?

A.—Well, as a rule the dwarf tree does not grow too high; the fruit ought to be picked off a six-foot step-ladder without any trouble. I do not think that a man can climb a twenty-five or thirty-foot ladder and make money picking either pears or apples. I do not approve of it at all myself. I think that in starting out an orchard it should be a matter that is seen to that every apple in it should be picked on a twenty-foot ladder, and starting out with the pear I think we should cut that ladder in two and pick them from a ten-foot step-ladder. I think that is where one of the biggest items in the profits of pear and apple growing comes in.

Then in regard to pruning, I might just say prune hard. The most successful pear-growers I know are very close pruners. They head back their trees freely and they grow the best and most uniform crops of any I know.

Q.—How do you carry your standard trees in regard to pruning? What system have you?

A.—I prefer a centre leader in a pear tree. That has not been my practice in an apple tree, although it is recommended. The Boussock and Howell are very free from blight with me. The best practice in my experience is to keep cutting the blight out as often as possible after it appears, to keep the disease from destroying it. It would be better on trees that are subject to blight to prune them on the branch system. Of course, if you prune on the leader system, and they are very subject to blight, and it starts to work down that leader, you will possibly lose the tree unless you take it off quickly by cutting it a foot or two below the blight.

At a meeting of this Association a good many years ago I was bold enough to raise the point as to whether the cherry and plum black-knots were the same, and some of those who were here declared they were. I have never seen a black-knot go from cherries to plums or from plums to cherries, and as to whether they are the same or not I am very skeptical; in fact my experience would lead me to doubt very much that they go from tree to tree. We have two or three varieties of apples that blight very much. The Boiken is very much like the Clapp. Then the

Greening and Stark are very bad for twig blight, and I find that that result is brought about whether they are planted with pears between them or not. I do not see any difference in my orchards. Some orchards have pears in them, and some have not, and the blight gets in some seasons, and stays away some seasons—that is the twig blight on the apples. I have no reason to think that the pear and apple blight will spread from tree to tree. The twig blight is very bad in my orchard at Burlington.

Now, getting down to the question of figures and profits, when you come to the profits of a pear orchard you deduct the value of the land. I have put the value of the land at $300 an acre, and, of course, some people say that is a lot of money, but supposing you buy a farm of one hundred acres and you go all over that farm and you pick out the best five or ten acre field there is in it, and devote it to any crop, you have taken the cream out of your farm; so probably $300 would not be too high to pay for the value of the land on which you have located your pear orchard. Then you want to put a good many trees on that land, that is, you want to have it occupied to the extent that it will bear good crops, mature them well, and have them a proper size. Then I would recommend moderately close planting and hard pruning. Then you have interest on that $300, $15 a year; also you have the cost of the trees and the planting, which will run up to $100, and that means $5 a year in interest to add as an annual element of expense. Then you have the cultivation and the pruning which I have put at the very low figure of $7 per acre. Then you have the uncertainty of the lives of pear trees to contend with. You have renewals to make. You have defective pear trees, because there will be some pear trees defective, many of them. I think that will give you an annual expense of $10 per acre. Then you have to pick and pack and market these pears, and this will cost you about $15 per acre. That will run your annual cost up to about $52 per acre. Now, as an offset to that, you have your crop, and planting we will say 10 x 12 you would get in the neighborhood of 350 dwarf pear trees to the acre, or 16 x 16 you would get about 140 or 150 standard trees per acre. Taking an average crop from these trees, you might count on from 200 to 250 bushels, by keeping your orchard up to a high standard, and you would get on an average up to $100 or a little more per acre. From that you must deduct the annual expense of from $50 to $55, which would leave you a net profit in the neighborhood of $50 per acre.

Q.—How many years do you count before the orchard comes to the bearing stage in paying quantity?

A.—Well, certainly not under seven or eight years. Our practice at home has been to intercrop with low growing crops. I do not like corn at all, as in the case of small trees it overshadows them, and I have had very bad results from it. I do not think any person need go into pear growing with the expectation of making such a large amount of money out of it as has been made from some other fruits.

PEAR GROWING IN NEW YORK STATE.

By J. E. Cornell, of Newburg, N.Y.

I am afraid I am going to say a few things to-day that are not absolutely orthodox from your point of view in regard to pear growing. I am aware that I am taking up one of the most difficult problems that confronts the Fruit Grower.

Pears have been a special thing with me. My first recollection in fruit rowing was the planting of a pear tree. My father had trees long before my ime, and I am planting trees yet for someone else. Someone said here to-day hat it was never known in this territory for a man to plant a pear orchard a econd time. I look upon the pear as my specialty.

I agree with Mr. Fisher in the matter of location for a pear orchard. He poke of well-drained soil. I would absolutely insist on a thorough drainage of he soil, because we have got some things to fight ahead of us, and we have to ave dry ground. I am free to say that I believe you have a great deal of land n Ontario that is planted in pears which had better be planted in something else. 'his tenacious sub-soil that you get in some places will never control blight, for you annot get the water out fast enough. On the Hudson, nature has taken our land p in a sort of rough form in places, and it did not lay the land out quite as nice s it did along Lake Ontario. I prefer land with a slope, giving natural drainage, hich also gives air-drainage, which is just as important as the drainage of the soil.

In regard to the distance to plant trees apart, I was thinking of my friend ere who was speaking of planting trees as close as 15 feet. I have been cutting ut trees that it almost broke my heart to do so where they were planted 18 feet part, in order to give room. The Bartlett would stand 18 feet. The Seckel I ould want at least 20 feet, though I would rather have them 25 feet.

I will name the varieties in order of importance. The Seckel buds early. Now you have been speaking of a big pear. There is no pear that will bring the ioney in New York and Boston that the Seckel will.

Q.—What size do you get the Seckel? A.—About 7¾ inches is about as arge a specimen as I have ever had. But a good-sized Seckel will run from 6½, to 7½ in fancy grades. Now showing how the market delights in the pear, No. 1 grade will bring $3 a box. These pears are all graded with a mechani- al grader, and they are all separated so that they are more uniform and better han can be done with the eye. The fact that I have carried them six weeks nd two months in the cooler without any loss shows that the pears are not njured.

The Bartlett is a good commercial pear; but with it we get a horrible black not down the Hudson River. In the winter of the year 1903-4 we had a win- er of Arctic severity—the summer preceding this cold winter was a very cold, et summer in the latter part of the season, and there was a large development f all kinds of the pest family, the foliage was injured, and the trees grew late, nd the fruit went into the winter unripened, and then we had a hard winter, ne of the coldest, in fact the coldest winter I ever recollect in that country, with he exception of one somewhere in the neighborhood of 1872 or 1873, and the esult was that we lost a great many Bartlett pear trees. I suppose probably 0,000 were wiped out in the Hudson Valley. I know I lost about 300. That s the first time in my experience in pear growing that I ever had any winter njury to pear trees, and I question whether we will ever see it again, because hen a man only sees it once in 50 or 60 years, he is not very likely to encounter t again.

Now, the question was taken up of crops for the young pear orchard. I ould say that when you are going to put small fruit in your orchard and fer- ilize it, you are getting a good strong rapid growth. You are then getting con- itions that you want to avoid, because if you are promoting a strong, succulent rowth, you are putting your trees in the position where they are susceptible to he attack of blight, which is really the greatest thing we have to contend with n pear growing.

I have planted currants in with pear trees. In growing small fruit, I would rather grow the currant than anything else, because the currant will succeed very well in the shade, and to a certain extent it holds the pear tree back. Where you are planting raspberries and strawberries, you are fertilizing pretty heavily, and you are forcing the growth too rapidly in my judgment. We hear a lot of mulch methods in regard to the apple. We would not consider that at all in the matter of the pear, because I do not think that there is a pear grower here that would admit any growth of grass. I saw some pears as I came along on the railway that it really almost made me feel bad to look at, because I saw that the deadly effects of blight had worked destruction in them. When you can see it right from the car window, you know that they have a pretty bad attack of it.

Q.—Is leaving them in sod for a year any use as to blight?

A.—I am going to speak on that point. Is it in our power to control blight? That is really the point that the history of the success or the failure of the pear business rests on—can we control pear blight? Well, my experience says we can. I have seen some of the most terrible attacks of it, I have seen orchards practically wiped out. But the last ten years I have had very little difficulty with blight. I think there is a great deal in the matter of prevention. An ounce of prevention is said to be better than a pound of cure—and if we have anything that will prevent blight, we are accomplishing a great deal. We find that blight varies from time to time. For instance we will have three or four years in which blight is peculiarly prevalent in a certain locality, and then it dies slowly away, and we are almost immune for a few years, when out it breaks again, and the loss is continued. When we are having a blight period, we do what we can to keep as much of the moisture out of the soil as is possible, for in a young pear orchard it will take up moisture very rapidly from the trees. In Washington, where they have studied this blight question, the experiments go to show that if you can withdraw the moisture from the soil, that will immediately check the spread of the blight, blight being a bacterial disease. Now, when blight starts with us, I go through my orchard early when the trees are in blossom—you can then determine from that blackened bloom that you have got blight, and it means that the blight has already started. I commence my work as soon as those blossoms have dropped, and these little blight twigs show up. It takes a whole lot of work and time, but it takes a good many years to get a pear tree, and we can afford to give the time. I had a Bartlett pear orchard that was showing up badly in the spring, I could see these little blighted twigs blossoming. I commenced right in on that orchard, and I followed it up for over two weeks, every other day going to see what would develop, and while before we finished I had cut down some nice large limbs, then it was but comparatively few, and I stopped the blight right there.

Q.—Do you burn what you cut off?

A.—I ordinarily do; but I am not afraid of it; when it is on the ground it is going to dry away.

Q.—Is there any danger of infection from the pruning tools?

A.—Yes. I am glad you spoke of that. They often spread it in an orchard. Blight can get into a wider area because the bacteria germ is carried from the blade on to another tree.

Now, one word further on the question of blight. The point is we want a soil that is absolutely well drained, in order to get the moisture out of it. I believe you can grow better fruit if you have a gravelly hill to put it on. The

Seckel I found blight-proof when it reaches age. The young Seckel is subject to blight troubles.

Q.—Is blight always communicated from the blossom?

A.—Largely—not invariably so. It is sometimes communicated on the very rapidly growing tree; but it is most generally and very largely communicated from the blossom. Mr. Fisher spoke of there being possibly a difference in apple tree twig blight and pear tree twig blight. The investigations at Washington show that it is identically the same thing. If you get blight, you have to watch it very closely; if they are stricken you have to get there very quickly or you are going to lose your opportunity. We have practically obliterated this trouble.

Q.—You went through every other part of it?

A.—I did. Now, generally speaking, in looking over our orchards, I have instructed my men if when they are going through the orchards when they see a case of blight, it does not make any difference what they are doing, to quit right there and get it out. I have impressed this on their minds. When you have blight there, get it out, or it will get you out of business. I do not know how it is in the Niagara district, but if you have this tenacious sub-soil, I do not believe you can get drainage rapid enough in the case of blight, and you are going to meet with a good deal of loss because you are going to get a strong growth from a strong soil. I don't believe much in dwarf pears.

Q.—What is your chief objection to dwarfs?

A.—They have not been profitable with me.

Q.—Not in having fruit?

A.—No. I have Seckel trees growing there that my father planted over 60 years ago, and these trees show just as much life and vigor, and if you were to look at them you would think they were planted only twenty years ago. The pear is a long-lived tree. The oldest trees I have are among the Seckel. They will average from two to three barrels. I have picked as many as five or six barrels of Seckels off a single tree, and when you are getting from $6 to $10 a barrel it is a pretty good return.

I might just diverge for a moment to say one word that comes in my mind in connection with the pear question. When they were speaking of the "Blue Condition" of 1896, when we had a great glut of apples in this country, and apples were being given away, I heard a prominent fruit grower of our city—and I guess Mr. Bassett may know him—say that the great trouble was the Baldwin apple. Everybody had planted it, and it just filled the apple market. What did it do? It increased our markets, which were taking apples where they never had apples before. It is just what you are doing with the grape business, and you may take low prices for a year or two, but you are going to put grapes in the hands of people that never had them before, and they will get into the habit of using them, and this overplus in the fruit market, whether it is apples, peaches, pears or grapes will be taken up.

MARKETING OF APPLES.

By R. J. Graham, of Belleville.

The question of "The Marketing of Apples" is a very broad one. If one could select the kind of apples they would like to market it would be a much simpler proposition, but in Canada we have to market what the Canadian people grow. I am not speaking now from a grower's point of view, but from the point

of view of one who has nothing to market but what we find in the country. If I had the arranging I would materially change what we find in the country; but the fact is, it is here, all varieties and all qualities, and the man to market this fruit as we find it has not only to be a scientific man, but also an artist in knowing how to do the thing itself. To be successful in marketing apples we have to do two things. First, we have to find profitable customers, and then to get them we have to inspire confidence; and therefore, the man, whether he likes it or not, has to be honest. The way we do it, and the way we ought to do it, are sometimes entirely different. The man who knoweth his duty and doeth it not, they say, shall be beaten with many stripes. There are many of us that have had the stripes until we have felt the effects of it seriously. I speak from experience. If I could buy the varieties I prefer, and get them packed in the crate I would like, and did not have to take anything else, I would be delighted; but unfortunately there are too many of us in the market buying apples. I think there is room for co-operation with the buyers as well as with the growers. I don't pose as a grower. I have been through that mill, and have suffered with the rest, and also have had some benefits therefrom; but what I have to say will be from the point of view of marketing what we have in the country.

The first thing to do is to locate what is in the country, whether it is good and whether it is poor, and then we have to find the people who want that kind of fruit, and we have also to study the individual peculiarities of the people who want it. We have to learn something of the markets that require these different kinds that are grown. Then we have to study the time these people need this fruit, and the price they are willing to pay for it. Therefore, there are innumerable things we have to get into our head before we begin to do the trick itself. There are matters to be considered between the consumer and the producer. We agree that the nearer the producer is to the consumer, the nearer we reach to ideal conditions, and such a man as myself, perhaps, could be well dispensed with if the producer had the scientific knowledge and the artistic touch that is necessary to do this thing. We should have spent our time in getting this education, having, of course, a natural desire to profit; and if I were to sell my education now for what it cost in dollars and cents, I would be able to retire from business.

Last winter I spent four months in the large consuming centres of Great Britain with a view to studying conditions, and I have a proposition to make to those who are in the co-operative business, and I presume that the most of you in this meeting are interested in one way or another. This is too large a proposition for me as an individual, but I will give it to you for what I consider it to be worth. I believe there is a splendid opportunity to popularize Canadian apples in the large English consuming centres. So far as my personal observation and statistics would lead me to believe, there is a very small proportion of the consuming public of Great Britain who eat Canadian apples, and with the present condition of Importers' Associations and Buyers' Associations, and walls-within-walls, by the time the grower gets his apple to the consumer the cider is pretty well sucked out of the business. I made the statement in Manchester before the Manchester Buyers' Association, and also before the Liverpool Buyers' Association, that if they would endeavor to popularize Canadian apples we would give them apples they could sell to the consumer at two pence, and so give them 25 per cent. profit, and they said the thing could not be done. I am prepared to say that it can be done, and you are the gentlemen that can do it. I took the trouble to correspond with the officials of five or six different centres, and I have with me the conditions that control the marketing of these commodities in Birmingham, Liverpool, Man-

chester, Hull, Sheffield and Bradford, and I find there is nothing expressly in any of these cities to prevent the distribution direct to the consumers just as you deliver milk around the city of Toronto. There is no reason why a hand-barrow system could not be adopted to sell apples in three grades. You know all cities have their west end and their east end and the grading of the population is largely in sections. We find in the west end of most cities the better class of people, those who can pay the better prices, and then we have in the east end the poorer class of people, and then the slums. My proposition is to get the sale of the apples all around, to sell for three pence or two pence a pound, and by doing that we would get $3.60 for the barrel of apples from the consumer. I found that in England good labor, reliable men and honest fellows, were willing to work for on an average four shillings a day. If such a man took a regular circuit, just as a milk wagon, and would undertake to call regularly every or on alternate days, the people would know this man would be there with the fruit. Let the man with the three penny fruit go into the better section, the man with the two penny fruit go into the east end, and the man with the penny fruit in the slums. By this means we would get all the people in these large consuming centres eating Canadian apples, by paying this man four shillings a day, and asking him to sell two barrels, which he can put on an ordinary barrow, and has done, in London.

It is not a very extravagant proposition for a man to sell two barrels of apples in ten hours. He would have to reach 100 customers to do that, and he is given four shillings for two barrels, and you have approximately what it costs to sell these apples in a Liverpool auction room. You would pay 11 pence per barrel at first, 5 per cent., and the man who comes into the sale room to buy the apples, as a rule, does it on a commission of 6 per cent. In this way you get the apple direct to the consumer there for exactly what it would cost you to get it through the auction room. If the apples are there in the way I have spoken of, and we can maintain a continuous supply of apples, they can come from cold storage warehouses and be distributed through one centre at Liverpool, and we could maintain that house on 10 cents a barrel. I claim that we could pay that sort of expense, pay the freight to those towns such as Bradford and Hull, pay our warehouse accommodation or cold storage rate, and we will have $3.70 a barrel back. Now there would be a Fruit Growers' Association there who would be glad to contract for your whole supply at $3.70 f.o.b. I don't think there is one of you who realizes what that means. Besides getting fair prices for your apples, you are popularizing the fruit by reaching a class of people you are not reaching to-day. If you who are in this business will co-operate in this way I am prepared to give you any assistance I can in that direction, because I believe it would create such a demand for the apples that those of us who are selling to our regular customers, as we do now, would have less difficulty than we have at present. It always has been a question, this over-production, and the difficulty in finding a profitable market for it. I believe it is practicable and feasible, and any time you want further information I shall be glad to assist you, but to make it practicable it has to be done with a continuous supply, and after you have worked up a trade you must have the apples the year round, and this can be done, I believe, satisfactorily and successfully.

Now you have two systems of packing apples, boxes *vs.* barrels. There has been a good deal of discussion along that line. There are some markets which will not take apples in barrels at all, and other markets which will not take apples in boxes. My experience is to give a man just what he wants; there is no use

trying to cram down a man what he does not want. There is no use trying to make a man buy Greenings when he wants Spys; there is no use trying to make him buy Russets if he wants Snows. That sort of thing will not work, and if we want to be successful in marketing we must give the public the kind of stuff they want. As we study the situation we will find there are people who want practically all the different kind of apples we produce. For instance, you will find one market that is specially good for one variety, and another market specially good for another variety. And so you go on until you cover the entire list of the apples we produce.

We have apples that are suitable to box and suitable to barrel. I do not think we should pack anything lower than a second grade in barrels or boxes. There are markets in Europe and in other countries as well, that will take all the surplus we have to sell in second-grade apples, evaporated apples and cider, and therefore I cannot urge upon you who are producers of apples too strongly this matter of co-operation for yourselves.

The time to sell your apples is the time that the fellow wants to buy them. Now, you may have your ideas about that, but my experience, covering a number of years, leads me to believe that the time to sell your apples is the time when there is a demand for the stuff, and to sell them in the proper season. You cannot sell apples that are out of season, no matter how well you have kept them. I had a splendid chance to test that last year. I put 60,000 barrels of apples in cold storage, and I found out that to put apples on the market out of season, even in good condition, will turn out to be an absolute failure. For instance, you take the Snow, which is the most popular apple between now and Christmas, and try to sell that apple in March; you could not do it, no matter how good it is, and you can apply that to all the varieties all along the line. You go to work and put a Ben Davis on the market now and ask a fellow to eat it; well, he will spit it out, he will not swallow it. You give him that apple next June or July and he will say it is a pretty good apple. So I think we waste our energy and lose a vast amount of money by mixing up all sorts together and putting them into a crate, and sending them to open market to be sold at one time.

Under present conditions it is very difficult for the producer to separate the few apples he has got to produce, so many different varieties in one orchard. But it is possible under a co-operative system such as I have suggested to the Chairman of the Transportation Committee. A most desirable thing to bring this about would be by securing through the Railway Commission the same facilities that are put into effect at present for other goods, allowing stopping-over privileges for loading apples that are going in one direction.

There is also no reason why the Government should allow us at the rate of $5 a car for icing apples that are going to Montreal for export, and absolutely refuse to give us a cent for apples going to Winnipeg or western points. There is, in my judgment, unjust discrimination, and that is something that the Government might well consider. I simply bring this matter up because there is such an arrangement existing. I say there is no reason why we should not get the same allowance to the West. You all have representatives in Parliament, and if you get after them perhaps they will come back at the Government, and you will get this concession.

GETTING TOGETHER.

By C. E. Bassett, Fennville, Mich.

This subject of "Getting Together" in any of the meetings where I have had the pleasure of speaking seems to have been an important one. How can I get more from a crop after I have raised it? I have no patience with the person who will spend any time discussing the over-production of fruit. There never was an over-production of fruit in the States, and I doubt if there ever was in Canada, because over-production means the producing of more than what people want. It has simply been a lack of distribution of that product by carefully getting it to the people who want it. There are not half the people in the States nor in Canada who have sufficient fruit or as much as they would buy if they could get it. The trouble is the distribution of it, the getting it to them in proper form, and at the price at which people can buy it. So I say I have no patience with anyone who will for a moment get cold feet on the over-production of fruit simply because he thinks there is more of it raised than ought to be. Our duty is to get that fruit to these people, because it is something which they want; it is something which will add to their life and vigor and strength; in every way it is a desirable product, something they ought to have; and it is our duty as producers, not only to ourselves as a money proposition, but as a matter of sentiment to see that such proper distribution is carried out.

I am going to treat this subject not as a concrete matter, but in the abstract, trying to apply it to some cases which have come under my own observation and experience, showing how we can get together, and get the producer and the consumer together, first by getting the men who produce the fruit together, and then afterwards the producer and consumer. I have only been a fruit grower for about twenty years. When I entered the occupation it was from a business experience and this soon brought to me the fact that one of the great faults was this lack of distribution, high transportation charges, and poor service, and that there were various other faults that must be remedied before we could expect to receive the wages which were due to the person who produced this fruit. I individually and with friends attempted to correct some of these faults, and we approached the railway companies feeling we might do or say something which would better our condition. At times we were received graciously, and at times we were not; and while we did possibly get a patient hearing, we were assured they could do nothing for us. It seemed to me that possibly, if individuals could not do anything, collectively we could, and as we were living and working in the fruit business, in a community where there was something like one thousand fruit growers, we called them together and asked them if they were satisfied with the conditions that existed at Fennville. It was generally agreed that the conditions were not such as they wished, so we organized a society with the idea that probably with this co-operative plan we could do something. I want you to follow me in this, and to figure out if you cannot adopt some of the methods which we have adopted and improve upon them and so get the benefit of what we have done and even more. I realize that I am talking to people from St. Catharines, where you have the best facilities in Ontario, and some of you are in places where similar work can be undertaken. When we organized I was one of a committee who went again to the railway company, and we asked that we be given a hearing on the matter of transportation. We were paying enormous express charges to the city of Chicago. It cost from 8c. down to 6c. per basket to carry a one-fifth bushel basket of peaches to Chicago,

and we were receiving a very poor service, our fruit was abused, and in case of shortages, a man would almost die of old age before we could get a settlement. We did not kick so much on the price, but we did want better service. We wanted our fruit to be handled better, and we wanted that it should be brought into the market early enough in the morning in order to receive the benefit of the early market. We found when we applied to the express company we could get no relief. We then tried to get to the railway company, and when the railway company was informed that the committee represented 600 of their patrons at Fennville, they listened to us, and tried to meet us. We worked out the problem how we could handle our fruits in the matter of transportation. We asked for a train of our own, a fast freight service which would leave our point at 6 o'clock in the evening, be run through on express time to reach the city of Chicago not later than 4 o'clock in the morning. We asked that we be allowed to load our own cars, and to have a man at the other end who was not only to unload but also to inspect those cars and to check the packages out to the commission houses, because we were doing all our business at that time through the commission merchants. As a result we got a rate of $52 a car, and we could put in those cars about 2,000 of these one-fifth bushel baskets, and after paying the rate of $52 a car, paying our loader $2.50 a car for loading, paying our unloader $5 a car for unloading, we were able to get the price from 6c. to 8c. down until we were handling it as low as 2c. Our ordinary rate is now 2½c. for the same service, except it is a good deal better. We pay our own shortages out of the profit. We have the fruit handled properly, because it is handled by our own people; we have had it put on the market at an earlier hour than if handled by the express people, and we have actually made a profit on top of that. Now, just think of getting it down from 6c. a basket and a poor service to a point where we handle it for 2½c., and an excellent service, all shortages paid beside, and a profit on top of that.

Now, we had no gravel in the country, so we again waited on the railway with the following explanation: "There is all that country lying equally distant between the lake and your railway, and if you will assist us by giving us some gravel to build a road into our building or to your railway, it will assist in bringing the fruit to you instead of sending it to the dump." They saw the wisdom of that, and answered: "We will deliver to you all the gravel that you will use if you will load and unload it, we will draw it for you, a distance of 38 miles." It cost labor to load it and unload it, and spread it, and cutting down the hills, etc. But what did that mean? We had as a result 8½ miles of a gravel road out of the profits from this extra fruit shipped, after reckoning good profits besides to the grower. It meant an actual dividend to every fruit grower who draws along that road because before we had those gravel roads it was very difficult for a good team over sandy roads to draw in excess of 40 bushels of fruit to the market; to-day it is a common sight to see them drawing from 100 to 110 bushels, the same team, and with less effort because we have cut down the hills. Now, that means that a man who had 100 bushels to deliver to-day would have to send two teams under the old plan and work them hard; under the present plan he can put them all on one load and deliver that amount and save that amount of time and work, which is worth at least $2; therefore he is receiving $2 dividend on every load of fruit he is drawing.

What else have we done? The packages at that time were different sizes. We had all kinds of packages, but decided that we must have a common package. The old package cost about 4¾c. apiece, but by adopting a common package, get-

ting all the basket makers to manufacture the one package, we are buying these now for $24 a thousand, which you will see is about half what we paid before. As a matter of fact the first year we did business one of our largest fruit growers actually saved $1,200 on his business in baskets alone. And that was not the only man, because as I say there were in the neighborhood of 600 men in the deal.

Now, we decided finally that we would not be satisfied with Chicago as a market, simply dumping our stuff in there on commission. We would rather have something to say as to what this fruit would sell for, than to ship it there and let them do what they like with it. We were not satisfied with the commission business. We wanted the people to come to Fennville and buy the goods there, paying us cash. How did we do it? We advertised our market, we sent out booklets from my office to every fruit and produce dealer anywhere within the range of our fruit, all the way through the northwest. As a result, commencing with early in the season and coming down to the present moment, there are always from ten to twenty buyers right there in our village, and it is very seldom we ship anything to Chicago on commission. I doubt if within the last eight years I have shipped $200 worth of fruit this way. Occasionally you have to dump a little stuff in there, but as a rule our goods are sold outright, and we know exactly what we are to get for them. By cutting out the middle-man we are reaching a class of people who now buy in car-load lots, where they formerly bought in small lots.

Now, there is another matter, the price of berry packages. I was interested when I heard about the price you are paying, twice as much as we do in the States, yet we are yelling for the privilege of having your timber shipped over there —a ridiculous situation. Here you have the timber, and still paying twice as much as we do. I do not know what is the matter with your local conditions. Our men tried to raise the price this year, and they would have succeeded if it were not for the co-operative board. We had been paying 12½c. as the standard price, and they raised the price to 14c. this year. We asked them why they were raising it; and their answer was, because they felt as though they had to. We did not feel that way; they had the same supply of timber as in previous years. We got in touch with a concern in Wisconsin where they would let us have those same crates at 11¼c. f.o.b. We asked our own people to handle and sell us the same baskets at 12½c., but they thought that we were simply bluffing, and refused. We sent for a car of the crates from Wisconsin, which proved to be much better than the local package. They were made of nice clean white wood, whereas we had been getting beech, elm, and everything else. We brought in quite a number of these crates, with the result that the local men suddenly discovered that they could afford to sell them for 12c. Now, if we had been doing business individually, we would have been paying 14c. this year.

Then we found, in order to sell and distribute our fruit properly, we should have some system of grading, packing and selling, so we adopted the Central Packing House System, practically the same as you have in St. Catharines. We had five Packing Houses at Fennville, for instance, in 1906, run by the buyers, but we practically cut off their supply of fruit and put some of them out of commission for the time being. These houses were run by men who had no particular interest in the fruit themselves.

The Central Packing House leads up to better packing, and that means —and I call attention to this as one of the most important things—to better growing. Our packing houses have had more to do with the raising of the standard of the fruit grown in our community than all the meetings we ever held, and all the talks that were ever given and arguments advanced. Better fruit is grown, better fruit is

packed, and it is packed in such a way that they can stamp their seal of approval on it, and the people know what they are buying when they do buy. You have a model plant at St. Catharines, and a model hand at the head of it; but I tell you that one of the hardest things in the world in connection with these Central Packing Houses is to get a good man at the head of them. A good man is entitled to the wage he earns. There are not very many Robert Thompsons in the States, and I tell you there are not many in this place. The management of a concern of that kind is a business proposition that requires an able man, a business man, and a man who knows his job.

Now, I might say that we have also saved in the matter of spraying materials, having adopted the method of co-operative buying there also. We make contracts for standard articles, articles which we know are good. There are spraying materials on the market which are absolutely worthless, and there are people who are gullible enough to buy those articles. We, however, as an Association, look into the merits of these goods, making contracts for our annual supply, and the result is that we save thousands of dollars to our growers in material such as blue vitriol, paris green or commercial lime sulphur. This buying is done on a strictly cash basis. If a man wants a barrel of blue vitriol, it costs him $4.25 a 100 lbs., 425 lbs. in the barrel. He must remit to me the actual cash amount before that order is filled. We are selling it to him at actual cost, and cannot take the chance of any loss whatever. We are saving large sums of money and getting the goods which are reliable and are just what the people want.

Now, I have presented here briefly some of the things that we have accomplished, but I realize that we have not yet done all that has to be done. I realize that we have a great many things yet which have to be worked out in future. But for pity's sake, do not get cold feet and talk about over-production. Produce all the good fruit you possibly can. There has been an over-production of poor fruit, but there never was, or never will be, an over-production of good fruit.

UNIFORMITY OF JUDGING SYSTEMS FOR EASTERN CANADA.

By W. T. Macoun, Horticulturist, Central Experimental Farm, Ottawa.

One has but to attend a number of the fall fairs in Eastern Canada to learn the great need of a more uniform system of judging fruits and the need of educating the exhibitor. At present there are many judges of fruit in Eastern Canada, some better than others, and but few of them having the same ideas on how fruit should be judged, and the value which should be placed on the different characteristics of the fruit. One judge may place too much importance upon size, while another lays too much stress on color and too little on freedom from blemishes, while a third may think little of the uniformity and trueness to type of the specimens, providing they are free from blemishes. All this is very confusing to the exhibitors, and the result is that there has been very little improvement during recent years in the quality of the fruit shown, especially at the smaller exhibitions. In some cases exhibitors have been so disgusted that they stopped exhibiting, while in other cases they change the character of their exhibits each year to meet the views of a particular judge, and if there is a new or unexpected judge, as frequently happens, they lose on the very points which awarded them the prize the previous year. Too often exhibitors blindly take their chance, not knowing, or apparently caring what the judges look for in exhibition fruit.

It seems to me that this could all be changed by having a circular with score cards for plate fruit and for collections and with explanations as to what is meant by "freedom from blemishes," "color," "uniformity," "size," "form," "quality," and "correct nomenclature." This circular could be incorporated with all the prize lists for fruit published in Eastern Canada, so that both the judge and the exhibitor would know what in the judgment of the different Provincial Associations is the relative importance of the different points in fruit. It would not be necessary for the judge to use score cards when judging, but if he had a score card before him he would know how he was expected to judge. If such a plan were generally adopted I feel sure that there would be a rapid improvement in the character of fruit shown at exhibitions and a marked improvement in the general effect. This result is very marked at the large fruit shows in Nova Scotia, where, owing largely to the efforts of Mr. R. W. Starr, Wolfville, N.S., exhibitors have been educated to the point that they must know what kind of fruit a good judge expects to see.

Last winter, when attending the Annual Meeting of the Prince Edward Island, Nova Scotia and New Brunswick Fruit Growers' Associations, I brought up and discussed the question of a more uniform system of judging for Eastern Canada, and what I had to say was very favorably received. A committee was appointed by the Nova Scotia Fruit Growers' Association to take up the subject, with the result that this provisional circular has been prepared.

I trust that the Ontario Fruit Growers' Association will see the great importance of this subject and do its share in forwarding the good work.

SCALE OF POINTS FOR JUDGING FRUIT PROPOSED BY THE FRUIT GROWERS' ASSOCIATION OF NOVA SCOTIA, 1909.

Score Card for Single Plates named.		Score card for collections.	
Points.		Points.	
25	Freedom from blemish.	20	Freedom from blemish.
25	Color.	15	Color.
20	Uniformity.	10	Uniformity.
15	Form.	10	Form.
15	Size.	10	Size.
		10	Commercial value.
		10	Quality.
		10	Nomenclature.
		5	Arrangement.
100		100	

Explanation of Terms.

Freedom from Blemish. Any injury by insects fungus, bruises, loss of stem or other cause, lessening the value or appearance of the exhibit, may be called a blemish.

Color. Bright, clear, well-developed color, characteristic of the variety preferred.

Form. Represents the perfect or normal type of the variety.

Uniformity. Specimens should be as nearly alike in size, form and color as possible.

Size. Indicates care and skill in production, and usually, other points being equal, size wins.

Commercial Value. Standard, known market varieties as grown in and suited to the district, preferred.

Quality. To be considered in collections, seedlings, new varieties on trial, or other sorts in competition.

Nomenclature. Exhibits must be correctly named according to the nomenclature adopted by the Society, Association or Exhibition at which they are shown.

Arrangement. Taste and skill in staging, so as to attract attention and add to the general appearance of the exhibit.

SPRAYING TEN ACRES OF APPLES—COST, EQUIPMENT AND RESULTS.

By Max Smith, Burlington.

I figure that an orchard of ten acres would probably contain on an average of 400 trees. I figure on the labor of three men to operate a power outfit, two men to handle the spraying rods—one on the tank, one on the ground, and one to drive the horses. I figure two men at $1.50 per day, $3.00, and a team and man at $4.50—that may be a little high, but that is what we have to pay in our country—making a total cost of $7.50 a day for help. Now the capacity of a power outfit should be about 1,500 gallons. Some days we would run more than that and some days less. That would give us a cost per gallon of one-half a cent.

Now, regarding the material, I wish to give you the results of the material I use. For my first spraying, I use the commercial lime and sulphur for scale or aphis or fungus. I use it at the strength of 1 to 11, and try to use it just before the buds are opening. As to the average price of commercial lime and sulphur, I figure it at $10 a barrel of 40 gallons, and one barrel diluted at 1 to 11 would make 480 gallons of spraying mixture, which would make a cost of 2.08 cents per spraying gallon. Now, at a cost of labor of .5 and cost of material at 2.08 would make a total cost of 2.58 cents per gallon. I figure on an ordinary sized tree 5 gallons to a tree—some trees will take a little less and some a little more—but I believe by judgment and care 5 gallons can be made to do the work. Now, at 5 gallons at tree, and 2.58 cents per gallon would make it cost 12.9 cents per tree for the first spraying. For the second spraying, for codling moth principally, and fungus, which I give just as the blossoms have fallen, I use commercial lime and sulphur at the same cost per barrel, but dilute it at 1 to 30 and that would make 1,240 gallons or a cost per gallon of .83 cents. I add with that arsenate of lead, which I figure at an average price of 14 cents a lb. in small packages; it would probably cost less in larger packages. I figure 2 lbs. of arsenate of lead to 40 gallons of water, or 5 lbs. to 100 gallons, making the arsenate of lead cost .7 cents per gallon. The labor will cost you just the same for your second and third sprayings, the lime and sulphur would cost .83 cents and the arsenate of lead .7 cents, making a total of 2.03 cents per gallon spraying mixture. At 5 gallons per tree that will make the second spraying cost 10.15 cents per tree. Now as to the third spraying which, in my opinion, should follow ten days to two weeks after the first, would take the same material and the same labor and the same cost, so for third spraying it would cost 2.03 per gallon, and at 5 gallons to a tree it would cost 10.15 cents per tree. Now, the first spraying at 12.9, and the second and third sprayings at 10.15, make a total of 33.2 cents per tree, for three thorough sprayings. Therefore, 400 trees would cost at that rate $132.80; at 4 gallons per tree it would reduce the cost one-fifth, making a cost of 26.56 cents per tree, or a total cost for 400 trees of $106.24. If you eliminate the third spraying, which is not necessary in all seasons, and I have seen excellent results with two sprayings, and taking 5 gallons to a tree, it would cost 23.05 cents per tree, or $92.20 for two thorough sprayings; or for two sprayings at 4 gallons to a tree, would cost $18 44 cents per tree or $73.76 for the 400 trees in a ten-acre orchard.

In regard to power, I use a 150 gallon tank and a gasoline engine. I prefer a 150 gallon tank to a 200 gallon tank. In one of the orchards it is very hilly and I find no trouble in getting around with a 150 gallon tank. I do not believe in horse power for spraying big trees. I do not think it is practicable. You can only

generate power when your wheels are in motion; I prefer gasoline engines to hand outfits for several reasons. I think first that they are far cheaper to operate. You can operate a gasoline engine for 10 to 15 cents a day for gasoline and you can get a higher and more even pressure.

Q.—What pressure do you use?

A.—I prefer a pressure of over 150 pounds. I have experimented this past season on different pressures, and I found that I got much better results from a pressure of 150 to 200 lbs.—an average of 175 lbs. As I say, high pressure is more economical in spraying. You can get where you want to more quickly, and you do not waste so much material. I think that high pressure is very essential for the second spraying, after the blossoms have come out. You cannot drive the spraying material into the calyx end of the blossom with 60 or 70 lbs. of pressure. I find it can be done better with a 150 or 200 lbs. or an average of 175, and high pressure for blossom spraying in my opinion is very important, and much better results can be attained with high pressure at that time than any other time.

Now, as to the matter of a pump. I would want to buy a pump that would give me that pressure. Some pumps will not; the capacity is not sufficient. You want a pump that will give you sufficient pressure and one that will give you sufficient capacity for the kind of nozzles which you propose to use. I would want a pump that would carry at least four large nozzles, two for each line of hose. I have in my work discarded the small nozzles altogether. I use a nozzle of the Friend type, of which there are a dozen different makes, and I find that I have less trouble and better results.

I think the question of hose is one of the most important. It is absolutely necessary that you get good hose. More time and money can be lost with poor hose than with any other part of the outfit; that part generally breaks down first. I would always buy a good hose fitted with large plugs and clamps. A good many of the hose plugs that are sold have only one. Have them made with long shanks so that you can put two clamps on them. I have quite a lot of trouble with those single clamp hose plugs. I used on one outfit this year four different lots of hose before I got a good hose. I would sooner pay 50 cents a foot for good hose than pay 5 cents a foot for cheap hose, as I would save it in loss of time. I think it pays nearly every time to buy the best you can. I recommend gasoline engines for another reason. They are always useful to a man on the farm. They can be easily attached to other things, generally by undoing three or four bolts, and they can do lots of little things on a farm. When I was through with my spraying I took it to my home and attached it to a little pump which I have there and it is now supplying water to three families. They do not need much looking after by any one who has any head and who can follow the instructions given and avoid trouble. I believe in thoroughness, as I think that is one of the most important features. There is an old saying that if you spare the rod you will spoil the child; I think that if you spare the material you will spoil the fruit every time. I believe in spraying the whole tree right from the root up. It does not pay to be stingy with spraying material at all.

As I have said, I have sprayed this year about 100 acres of fruit, practically covering all kinds but peaches. We do not grow any peaches in our section. I sprayed apples, plums, pears, cherries, grapes, red currants, and gooseberries, and I have had very gratifying results in all cases. I used just the same material on the grapes as I did on the others. I might instance the red currants. We have about five acres of red currants, and we generally figure to get from $600 to $1,000 for them. This year I sprayed them very thoroughly, at the same strength,

and about the same time as I sprayed my apples for the first and second spraying. We had in our district this year a very large crop of currants and a bulk of those currants in that district were harvested at 4 to 5 cents a quart. With my spraying this year I noticed that I had a very heavy foliage, the heaviest foliage I ever saw on red currants. So I decided that while other people were picking their currants I would leave mine, and did not pick a currant until I think every currant in the district had been picked and shipped. Then I started picking my red currants, and never got less than 10 cents for a single quart, and I never had a blistered currant in the whole of the 600 and some odd crates. I could instance that of the thousands of baskets of cherries in our district only those cherries which were thoroughly sprayed were worth buying at all. I know of different growers there who grew from two to three thousand baskets, and it was almost impossible to find a bad cherry in the whole pack. There were some men who did not spray their cherries and the following morning after they were picked they were rotten. I buy large quantities of cherries and I know that from experience, because I have had some of them refused where they had been shipped out, and I have kept them in my own office for my own investigation. I spray the cherries just before the buds swell, and then spray with a second spraying just after the small cherry forms. I just spray twice for cherries.

Now I do not want to take up your time, but I might just instance one particular orchard of forty acres which had never been sprayed nor pruned nor plowed nor fertilized in twenty years, so you can all figure about the shape that orchard was in. I got possession of that in March, and I sent about six men there to prune it, and I put on 10 lbs. of strong commercial fertilizer around each tree; and I sprayed it very thoroughly according to the directions I have given you, and with the materials of which I have told you. I plowed that orchard and tried to keep it cultivated all season, and I harvested over 2,000 barrels of beautiful apples. I have known that orchard for the last 20 years, and for the last ten years particularly, and the apples in that orchard have been perfect rubbish; in fact a year ago I refused the orchard for the picking of it. I controlled the fungus, and failed to find any fungus of any description in the orchard. I controlled the codling moth to the extent of about 80 per cent., which I thought was very good under the circumstances.

I was going to say that I have been an apple buyer for a good many years, and I have come to the conclusion that there is more money growing apples than there is in buying them or handling them in any other way ; it is surer money, it is easier made money, and you eliminate a lot of work and worry. You will never hear of an exclusive apple grower going broke, but you will hear of many an apple buyer going broke. I would ask for no nicer inheritance than 100 acres of good apples. I like apple growing, and I would just as soon grow apples as anything I know of, as I think there is more money in them than there is in any other branch of horticulture or farming.

I will just say that I think a farmer who neglects to take care of his orchard is penny wise and pound foolish. I do not think any part of his farm will pay him one quarter as well as his apple orchard will pay him. There is a great future for apples in this country ; the North-west has developed into a great market, and in a very short time they will take all the apples we can give them. They want good apples, and they are willing to pay high prices for them. I myself could have sold thousands of bushels more apples than I did if I could have procured them and would have gotten very good prices for them.

Q.—What do you call good prices ?

A.—I call $1.50 a moderately good price. I have paid $1.75 to $1.85.

Q.—When you paid that you had a profit ?

A.—Yes. I would pay $2 for 10,000 barrels of good apples, and could sell them at a profit.

In conclusion, I would like to draw one or two comparisons of what 33 cents a tree means. It might appear to some a big item of expense to spend 33 cents a tree. A bushel of culls is worth 15 cents and a bushel of good apples is worth 50 cents ; therefore the difference between a bushel of culls and good apples is 30 cents in the present market. Now, on an average a tree should produce 10 bushels, which is not a big average—some would produce 20 and some 5—and if you convert one bushel of culls at 15 cents into one bushel of good apples at 50 cents you are making 35 cents. If you have a tree of apples bearing 10 bushels and do not spray them, you will have half culls, and if you convert that 5 bushels into good apples, you will make $1.75 profit on that one tree, or on 400 trees a net profit of $700. That is not the profit on your orchard, but that is over and above what you would get if you did not spray. Take the cost of your spraying off that, and it means a net profit of $567. Besides all that you will do a tree a lot of good, you will strengthen it, and stimulate it and produce a better crop another year, and you would also help your neighbors by getting rid of a lot of pests.

THE APPLE ORCHARDS OF THE LAKE HURON SHORE.

By S. E. Todd, Guelph.

During the past summer, in company with Mr. T. B. Faulds, also of Guelph, I was employed by the Fruit Branch of the Ontario Department of Agriculture and by the College Department of Horticulture to do orchard survey work in what is known as the Lake Huron District. I have here a chart showing something of the geographical position of the territory, comparing it with other sections. The 43rd parallel of latitude runs a little north of Sarnia, but just south of Forest. To show you the position of the other fruit belts of the Province, St. Catharines comes through about five or six miles north of Forest. A line from Hamilton would run through Grand Bend, a little post-office at the extreme north end of Lambton County. You see, therefore, that Lambton County, geographically is south of the great peach district. Up here in the centre of this great apple district, we have the line passing through within about 12 miles of Galt, and a little further north we have the 44th parallel of latitude; then about 6 miles south of Kincardine you have the Blyth line. Now, a few miles east of Blyth, east north-east, is about the limit, I understand, of the Baldwin and King for commercial purposes. But we found the Baldwin and King growing north of this point.

The counties we covered were portions of Lambton, Middlesex, Huron and Bruce, working in about 15 to 18 miles from the lake shore. I do not mean to say by any means that that was the limit of the apple-growing section eastward, but that was the limit we were told to work on. This district is, I may say, practically unexplored as a fruit-growing region. Such men as Mr. Johnston and Mr. Sherrington have exploited certain portions, but to a very great extent it is as yet untouched. There is a lot of fruit in the country, and some few sections as

stated are being farmed very well indeed. But the facts as they stand at the present time give no indication of the possibilities of the industry.

On this chart we have marked out temperature lines. You will remember that yesterday there was considerable discussion about what temperatures obtained in Lambton County. These temperatures were not got from Government reports, because there are none available for that section, but they were secured from the people, and are only approximate. We tried to secure as nearly as possible the maximum winter temperatures of the average winter, not the extreme of an extreme winter, but rather the extremes of an ordinary winter. There is a little section in the south which may extend down to Sarnia where the thermometer goes down in winter to about zero, just along by the lake shore. This is right in Mr. Johnston's own section. In Huron County, at Drysdale, a little north, it goes down to about 10 degrees below zero, and you will notice how that line follows the lake shore for a piece and then gradually extends inward. Then at Bayfield, in Huron County, going down towards the shore and running up to Goderich it goes down to somewhere about 16 degrees below zero. You will see how it leaves the shore and gets further inland as you get up around Kincardine, where they tell me it goes down to about 20 degres below and that the line then recedes inland. The reason that it recedes inland there to a certain extent, is because of the difference in elevation which is continually rising. At Forest it is about 600 feet above the sea level. Lake Huron is about 581 feet but it rises rapidly as you go north to 800 feet, then 900 feet, and finally to 1,000 feet. You will note by the map how the country is rising as it leaves the lake shore and rising very rapidly.

In the northern section of Lambton county there is a considerable controversy, as you know, going on at the present time as to whether this will ever be a great peach section. From what we have observed we can say there is no reason whatever why this part of the country should not be producing the very finest of peaches, and, in fact, nearly everything else that can be grown in a tender fruit section. There are peach orchards there of twelve, fourteen, fifteen years of age that have come through the great frost of 1904 without any bad results. Of course the nearer the lake shore the better the orchards. Now this gravelly ridge that runs through here is important in this regard, in that it is four or five miles from the shore, leaving a big section right close to the shore that has soil quite suitable to peaches. There is a man up at Drysdale who has planted a small peach orchard for experimental purposes. At Goderich I found a ten-year-old peach orchard with about 500 trees that were bearing well this year.

THE PRESIDENT: How frequently had they borne?

MR. TODD: These trees had been utterly neglected for a great many years. The owner said that they had borne about every second or third year, and he told me that what is being done there gives no idea of the possibilities, because the orchard had not been properly handled.

Now, coming more directly to the subject of the orchards, the first thing, of course, is the question of the nursery stock that is used in that section. In regard to the apple stock, it seemes to have been fairly good, but what astonished us was the numerous complaints of the substitution of varieties by nurserymen—order one thing and get another. In peach stock these men have been ordering what they thought was very fine stock, four to five feet high. Nowadays you want stock three to four feet high, but these people have been paying a high price, because they

thought they were getting an extra good article. Realizing now that they have been fooled, they are a little bit sore on the subject. Of course that can be all cured by proper handling.

As to the quantity of land suitable for apple culture in that section, it is only limited, in fact, to the extent to which drainage can be practised. The whole country, with one small section, can be made one great orchard as far as that is concerned, but the question of drainage is very important. Some of the most profitable orchards I have seen were on this land, which was properly drained. One man said he had an orchard of four acres which had been drained but never cared for. He started to look after that orchard about five years ago, and had at that time a $2,000 mortgage on his farm, and in the next four years the orchard paid off the mortgage and left his farm clear of all debt. This mortgage had been running for twenty or twenty-five years.

In Lambton county there is a large number of trees in and around Wyoming, and containing some very fine orchards. The best I have seen this year is the one of Mr. E. V. Morningstar's. He is a great cultivator, sprayer and fertilizer, and he certainly gets results.

In Middlesex there is a section that is planted largely, but is utterly neglected. Perhaps the most extensive planting there is in Huron in one spot is right in between Goderich and Bayfield, a district of about ten miles long and four miles wide, containing about 500 acres of orchard. As you go up towards Blyth there is quite a section in there again that has big plantations. Nearly all the big orchards, excepting around Forest, are east of this gravelly ridge I mentioned. The reason is that they have not had sufficient drainage in other sections excepting around Forest to get good results from apple culture. Wherever they have practiced drainage, however, they are getting good returns.

It is a strange thing the number of insects that you will find in an old orchard that has been uncared for. We would go into a man's orchard who had been years ago getting good crops, and to-day was getting nothing. We would ask him what was the matter with his orchard; he would say that he guessed the orchard had got too old, (35 or 40 years), and it was of no use. On examination we have found as many as twenty cigar-case bearers on one leaf, and along with that there would be everything else that you could name in the shape of insects. The owner would see caterpillars, but because these were small insects he was unable to locate them by just walking through the orchard, and so had no idea what was the matter with the trees. These insects were sapping the life out of his orchard. Quite a number of men who are spraying find they are still troubled with these small pests because they are not spraying at the right time. I find that there is a great deal of educational work that needs to be done as to the time to spray, the history of the insect, etc.

Oyster-shell bark louse is not common in the southern end of the district. In Lambton county, for instance, there was not much bark louse, but as you went further north the insect was more noticeable. I have seen some splendid results this summer with the application of lime sulphur to orchards that were badly infested with insects, but they were so bad that they were not entirely cleaned out with the one application.

In that section this summer they told me the codling moth was not so bad as it has been, but in Middlesex county we found that about 80 per cent. were affected. In Mr. Morningstar's orchard at Arkona, and Mr. Johnson's orchard at Forest, you would find trees on which it was difficult to find apples that were affected at all by

the moth. These orchards, of course, had been thoroughly sprayed. Mr. Morningstar's manner of treatment is to spray with lime sulphur first before the buds open, and spray them with Bordeaux just before bloom, and again after bloom. That was all he sprayed, but he certainly sprayed thoroughly and used an excess of lime.

Aphis in that section this summer were extremely bad. The question as to whether lime sulphur will control aphis when applied in the winter time was one that was not determined, but we got some information upon it. We found one man in particular who had sprayed part of his orchard with lime sulphur, but it got so late that he did not spray the rest of his orchard. That part which was sprayed was much freer of aphis than that which was not.

In Lambton county winter injury is practically unknown. Once in a while you will find a tree that is very high headed, an open top tree that is affected by sunscald. I found two orchards alongside of one another, the first with high-headed trees, and the other with low-headed trees. The high-headed trees were all sunscalded, while 95 per cent. of the low-headed trees were not affected at all. All the way up sunscald is practically unknown, except in places where the trees are headed very high and the tops kept wide open. There you will get sunscald on all the trunks and on the big limbs. Just east of Goderich there is a section of country very much exposed to the lake which is affected. Wherever there was a tree that was in any way high headed or inclined to be open, you would get sunscald.

As you go further north there seems to be very little winter injury. In certain localities we found some apple canker. There was none of it that seemed to be very serious anywhere, not at all like what they had down in Prince Edward county or down along the Lake Ontario shore. We found in and around Forest some apple canker, but in orchards that were being thoroughly sprayed by the owners they did not know what the canker was. I was talking to a buyer, who mentioned the fact that this section north of Goderich is being affected by the San Jose scale. I do not know how that report spread, as I saw absolutely no sign of it, and the report is unfair to that section.

Twig blight in the whole section was very bad this year. I saw one most remarkable instance of the effect of insects in carrying the disease. In Mr. Johnson's orchard there was a pear tree badly affected by twig blight There were four Holland Pippin trees around, one side of which had bloomed in the spring and the other did not. The side of the trees that had bloomed was a complete brown mass as a result of the twig blight. The opposite side of the trees, where there had been no bloom at all, was entirely free. I should think that this was conclusive evidence that the blossoms are one of the very worst means of carrying disease, and that one tree in an orchard affected by blight at blooming time is sufficient to affect the whole orchard. In the varieties of trees that were affected by twig blight we found the Holland Pippin, Tolman and Greening about the most affected. I think that some men in other districts have found it different. We did not consider the St Lawrence bad at all, nor did we find the Alexander very bad, as we took particular note of the trees as we went through.

Now the effect of the aphis in carrying twig blight is, I think, quite marked on the water sprouts of the trees, and with the aphis, late in the summer you would find twig blight when you would not find it in other places. The aphis congregated on these sprouts.

With reference to spraying, there was a lot of poor work done in different

sections. The men did not know, or did not take sufficient trouble to spray properly. I think a great deal of educational work should be done in bringing people to a knowledge of how to spray and what to spray for to get the best results. Men have said to me that they feel spraying is all right, but that they do not know how or when to spray.

In conclusion, I think the opportunities in this part of the country are as good as in other places in the Province, if not better. You have here a great section of country which is very favored in regard to its position climatically. You have all kinds of land—gravel and clay loam and a deep loam soil. You have the kind of land that is wanted to grow the different kinds of fruit. The climate is probably equal here to the best that there is in the Province, and it is only a question of time until this country must become one of the finest fruit sections in the Province of Ontario.

LIME-SULPHUR *Vs.* BORDEAUX FOR SUMMER SPRAYING OF APPLE AND PEAR ORCHARDS.

By L. Caesar, o.a.c., Guelph.

Before proceeding to the discussion of the value of lime-sulphur as a summer spray for apple and pear orchards, let us first briefly call to mind the main fungus diseases of these orchards that require a summer treatment. In apple orchards the main one is clearly Apple Scab or Black Spot, as it is sometimes called. Less important diseases are the Leaf Spot and Baldwin Spot. Black Rot Canker is a very serious disease attacking the trunk and branches, but its main treatment must be before the buds burst; yet as the summer treatment is also important, we shall include it in our list. In pear orchards we shall only deal with Pear Scab, omitting the different kinds of leaf spot, because these are not often serious and lime-sulphur has not been tested on them. Pear Blight, Twig Blight or Fire Blight, which are all the same disease, is not caused by a fungus, and apparently cannot be controlled to any appreciable extent by spraying, so it is omitted.

In spraying for any of the above-mentioned diseases it is clear that no mixture can be given a fair chance unless it is applied at the right time and in a thorough manner. Hence a word or two about these points.

To prevent most fungus diseases the spray mixture must be applied before the disease gets any chance to make headway; in short, it should be applied early enough to prevent the spores getting a chance to germinate. Hence the date of the first application is usually of special importance. For Apple Scab the first spraying should be shortly before the blossoms open. If left until the blossoms fall the disease gets a great start; for the first signs of it are on the leaves about the time of the opening of the first blossoms. The second spraying should be just after most of the blossoms have fallen, which is the time to spray for codling worms; the third either two or three weeks later. Of these three applications, the first and second are by far the most important and should never be omitted.

Leaf-spot and Canker are controlled by the same sprayings as the Scab, except that Canker requires a special spring application in addition to these. It should be noted that Leaf-spot is usually caused by the same fungus as causes the Canker, namely, the Black Rot.

Baldwin Spot appears much later in the season, and so requires separate treatment. The first spraying for it should be about July 1st, and the second about two weeks later. It is seldom, however, that it is so severe in Ontario as to make spraying necessary.

Pear Scab begins earlier than Apple Scab, and so requires that the first spraying should be made just as the buds are ready to burst. The second application should be just before the blossoms open, the third at once after the blossoms have fallen, and the fourth about three weeks later. The early first application seems to be necessary for even fair results.

We all know, however, that it is not only necessary to spray at the right dates, but also to do it thoroughly. Most of us who have done much spraying know that it is very seldom that a really thorough job is done. The trees are often only half sprayed. Perhaps this is, in a number of cases, due to the old motto to "Stop spraying just before the leaves begin to drip." This is not a safe motto, and our first rule should be: *"Make sure that every leaf and fruit is thoroughly covered";* and second, *"Try to do this with as little waste as possible."* One cannot emphasize this thoroughness too much. No man deserves real good results without it, nor indeed is he likely to get them.

Now let us pass to the mixture and the results. Bordeaux has for so long been the standard fungicide for all the above-named diseases of the orchard that it sounds almost startling to us at first to hear that it has a close rival in lime-sulphur. This wash, either in the commercial or self-boiled form, has been considerably experimented with in apple orchards as a summer wash, especially the last two years. The results given are sufficiently good to show that it has much merit as a fungicide for apple diseases. They do not, however, show that it is a better fungicide than Bordeaux, so that those who "Swear by Bordeaux" may still continue to do so.

Taking up first the results upon Apple Scab: Prof. Scott, of Washington, D.C., and Dr. Brooks, of New Hampshire Experiment Station, have each made a good many careful tests of both the self-boiled and commercial lime-sulphur upon this disease. Each report the commercial wash as giving almost as good results as Bordeaux. The self-boiled in last year's experiments did not give quite so good results, although it showed a fair degree of merit. It was, however, made with cold water instead of hot, which would almost certainly have given better results. I have not seen the reports of this year's work, but from Dr. Waite's remarks at the American Pomological Society, recently held at St. Catharines, I infer that Prof. Scott has been much pleased with the way the self-boiled mixture has also controlled the Scab.

In experiments conducted by myself at Guelph this summer I sprayed eight fairly large Snow apple trees with the Vanco brand of commercial lime-sulphur. The west side received the three applications at the times mentioned above; the east side, owing to my enforced absence, had to go without the middle spraying. For the first application a strength of 1 to 25 was used. This burned the leaves slightly, so 1 to 40 was used for the other sprayings, and no injury resulted. The spraying was very thoroughly done. In September the fruit was examined, and on the west side, where three sprayings were given, less than 1 per cent. of it was scabby; on the east, where the important spraying just after the blossoms fell had to be omitted, nearly 15 per cent. of the apples were scabby. The fruit, moreover, was free from russeting, and the surface smooth and glossy. Similar results have been reported to me by correspondents lately, so that there is practically no doubt that lime-sulphur, especially commercial lime-sulphur, can control Apple Scab in a very satisfactory way—in fact, just about as well as Bordeaux.

One point, however, has scarcely been sufficiently well tested yet, viz., whether as good results can be secured in wet seasons. The last two summers have been dry and have given the wash a good chance. It is almost certain that a soluble substance like commercial lime-sulphur would wash off more rapidly than Bordeaux. If so, its efficiency would be lessened unless an extra application was made.

On Pear Scab I have not got definite data from any experiments except my own. In the College orchard at Guelph there are six or seven Flemish Beauty trees near each other in three rows. Two trees in the middle row were chosen. The fruit and leaves of these were both very scabby last yar. They were sprayed this summer at the proper dates mentioned above with Vanco lime-sulphur. The first application was of the strength 1 to 9, the second 1 to 25, but as this burned the foliage considerably the other two were each made 1 to 50. In September, when picked, the pears were absolutely free from scab, as were also the leaves. All the surrounding trees, which had received three applciations of Bordeaux, had considerable scab on both the fruit and leaves. Probably, if they had got the first application (the one omitted) they would also have been quite clean. However, the experiment showed clearly that commercial lime-sulphur would control Pear Scab even on Flemish Beauty trees.

As for Leaf-spot, Dr. Brooks has been making a close study of the cause and remedy for this disease. He finds that the regular sprayings with either Bordeaux or lime-sulphur will control it quite satisfactorily. This is valuable information, because Prof. Scott and Dr. Brooks have both demonstrated that the disease which causes most of these small round spots on the leaves is also the cause of the Black Rot Canker, and so a wash that will control it in one form will also control it in any other. The Leaf-spot seldom does much damage to the leaves, but its prevalence will help to spread the cankers, which are very serious and require special care. Therefore its control is of importance.

There is not time here to discuss the proper method of treatment for cankers, but, as said above, the first spraying must be in the spring before the buds burst, as the spores spread very early and must not get a chance to germinate. Lime-sulphur of the regular home-boiled type has been well tested this year for the spring application, and those who have used it think it vastly superior as a spring treatment to Bordeaux. The summer applications, as said above, should be the same as for Apple Scab, and either Bordeaux or lime-sulphur, preferably the commercial form, may be used. As the cankers occur on the trunks and branches, these will require to be very carefully sprayed in districts where cankers abound. Badly infested orchards treated in this way this year show no new infections and a great improvement in the health of the trees.

Tests made by Brooks showed that Baldwin Spot could also be controlled by these forms of lime-sulphur or by Bordeaux if applied at the proper dates mentioned above.

We have now seen that there is very little or no doubt that lime-sulphur, either of the commercial or of the self-boiled type (hot water being used in making the latter), but preferably commercial, will control the ordinary diseases of the orchard almost as well as Bordeaux, the difference being very slight, if any. But there are still several very important points to take into consideration, and the first of these is whether we can use an arsenical with the lime-sulphur to kill biting insects, such as the Codling Worm. If not, there are very few fruit-growers who will have time to make the extra applications necessary. We all know that with Bordeaux we can use arsenate of lead, or Paris green, or arsenite of lime, and not fear that any evil

effects will result from the combination. With the self-boiled lime-sulphur, where there is a great abundance of lime, there is no doubt that any of the above poisons may be used with safety. I have myself used all three, and seen not the slightest sign of injury, although I purposely drenched the foliage and used the poisons stronger than required. With the commercial lime-sulphur arsenate of lead has been tested many times and very little injury has in most cases followed, so that this poison may be used. Paris green, on the other hand, has caused considerable burning in a number of cases, although not in all, and its use therefore cannot be recommended. Arsenite of lime was thought to be the safest form of poison for use with the lime sulphur, but recent investigations show that it is apt to injure the foliage. Arsenate of lead, then, is the only form of arsenical poison which can be recommended for this purpose.

There is still one more point to take into consideration, namely, the comparative cost of the lime-sulphur mixture and of Bordeaux.

If the materials used are bought in large quantities they can be obtained at the following prices:

Sulphur ..... $1.50 per cwt., or 1½ cents per lb.
Lime..... 25 cents per bushel of about 60 lbs.
Bluestone (copper sulphate).. 5 cents per lb.

At these figures one barrel of the self-boiled lime-sulphur of the strength of 10 lbs. lime and 10 lbs. sulphur to 40 gallons of water will cost: Lime, 5 cents; sulphur, 15 cents; about 2 cents for the fuel used to boil the water required for slaking the lime; total, 22 cents.

One barrel of Bordeaux, 4-4-40 formula, will cost: Lime, 2 cents; bluestone, 20 cents; total 22 cents. The Vanco brand of commercial lime-sulphur costs $8 a barrel or about 20 cents per gallon. If we use it at the strength of 1 gallon to 30 gallons of water, which is probably as strong as the foliage will stand, it will cost approximately 27 cents per barrel of diluted spray.

From these figures we see that the difference in cost is very little, the commercial wash being 5 cents a barrel dearer, but requiring much less labor to prepare it.

One other point should be mentioned before closing. The lime-sulphur washes have considerable value, much more than Bordeaux, as insecticides in destroying the newly-hatched San José or oyster-shell scales. A thorough application of the commercial wash last summer just after the oyster-shell scale eggs had hatched killed a very large percentage of them, and therefore added to the merits of the wash.

Now, in conclusion, the question comes up: Which are we to use for a summer spray, lime-sulphur or Bordeaux? Each man will have to answer this question for himself now that he has heard the "pros and cons." If his orchard is infested with San José scale, or if he has not got the oyster-shell scale under control, I should advise him to use the lime-sulphur wash, preferably the commercial form; if these insects have not to be combated he might experiment with this wash on a few rows, but should not be in a hurry to give up Bordeaux, as the latter is, on the whole, slightly the better fungicide.

THE COLD STORAGE OF APPLES AND OTHER FRUITS.

By J. A. Ruddick, Dairy and Cold Storage Commissioner, Ottawa.

A good deal has been said in recent years about the possibilties of cold storage as an aid to the fruit-growing industry in Canada, and interest in the subject is growing rapidly.

As the subject is a comparatively new one, on which it is not yet possible to bring very much authoritative data to bear, it is not surprising that there should be some difference of opinion concerning it, and that superficial and sometimes erroneous views should be put forward by perfectly honest and well-meaning persons. Your humble servant does not expect to say the last word on the subject on the present occasion, or on any other occasion for that matter, but it is possible that exceptional opportunities for studying the whole question of cold storage in relation to the preservation and handling of food products may have enabled me to acquire some information which I hope will be useful to the members of this Association. Anyone who has followed the matter closely must be convinced that there is a fine opportunity to improve the fruit trade of Ontario by the intelligent employment of cold storage and refrigeration in transit. I could quote many instances where the value of apples stored or shipped in cold storage, has been greatly enhanced. As an instance, a sales catalogue from Glasgow of recent date, shows that cold storage Kings SS. "Pretorian," fetched thirty-one shillings, while the highest paid that day for the same variety shipped as ordinary cargo in the same steamer was twenty-four shillings and six pence. Other varieties show similar differences: Wealthies in cold storage sold for twenty-four shillings, as compared with fourteen shillings and six pence for those carried as ordinary cargo, and so on.

I quote these figures merely to indicate the possibilities of shipping early apples in cold storage and not as an attempt to prove that such results could always be obtained.

As fruit growers, rather than shippers, you are more interested in cold storage on land, and I shall confine myself to that phase of the question, and get as near to the orchard as possible, for that is where cold storage will be the most effective.

There are, however, some things which cold storage will not do, and it is just as well that we should have at the beginning, a clear understanding of its limitations as well as of its possibilities. Reference has frequently been made to the large quantities of apples which are wasted every year in Ontario orchards, especially when there is a heavy crop, and it has been urged that if cold storage was available, all this enormous loss would be avoided. I need hardly say to experienced fruit growers, that such an assumption is an absolute fallacy; that it is not cold storage which is needed primarily, but better orchard methods and management. The fruit grower who depends on cold storage to preserve windfalls, worm-eaten, bruised and skin-punctured apples from early decay, will be grievously disappointed.

The lowest temperature which it is possible to employ does not absolutely stop either the life processes of the apple or all of those destructive changes which include various forms of rot, etc. It only checks them, but some forms of decay are checked more effectively than others. Experiments at Geneva showed that Pink Rot, Black Rot and Bitter Rot developed very little in cold storage, but that

the ordinary Soft Rot, which is due to the growth of the common blue mould (Penicillium glaucum) and which is probably the most common form of apple decay, is not prevented to any marked extent. Fortunately, the apple resists the attacks of this mould, unless there has been some puncture or weakening of the skin due to fungus or bruising, until it begins to deteriorate with old age. The injury need only be of the slightest character—a mere pin prick, for instance—to provide an open door for the entrance of the spores of the destroying mould.

If you place over-mature or ripe apples in cold storage, they are bound to go down in a short time. Let me here digress to make myself clear on the two terms, "maturity" and "ripeness." I would call an apple mature when it is fully grown and well colored for the variety, and call it ripe when it reaches its best condition for eating. The length of time which elapses between maturity and ripeness varies greatly according to variety. In some earlier or quick ripening varieties, it is only a matter of days, while in others it becomes a question of weeks and even months.

The foregoing is probably more of a practical definition than a scientific one, for I suppose nature intended all apples to ripen fully on the trees, but man with his perverseness, has shifted things around that he is growing many varieties in latitudes and climates where they cannot possibly do so. I do not say there is anything wrong in that. We call such apples mature when they reach the stage in which we are accustomed to find them as taken from the tree.

Early Varieties Should Not be Held. The earliest varieties should be rushed to the market as quickly as possible to take advantage of the early trade. Prompt chilling before shipment is all that cold storage should be expected to do for apples of this class. Even with varieties whose qualities would commend them in competition with others past their regular season, some caution is necessary, because if an apple is carried much past the time when experience has taught every one that it has reached its best and may be expected to "go down," dealers would hesitate before handling it.

Keeping Quality of Varieties of Apples in Cold Storage. It is not an easy matter to determine experimentally as to the relative keeping quality of different varieties of apples in cold storage, because of the difficulty of securing the different varieties at exactly the same stage of maturity, and unless that is done, any test is unreliable and the results are misleading. Generally speaking, those varieties which ripen most slowly will keep the longest.

Some varieties hold their quality much better than others. That is to say, certain varieties retain their crisp, juicy texture and characteristic flavor almost to the end, while others become mealy and insipid long before the structure of the apple breaks down. Of course, they act the same way in any kind of storage. This, it seems to me, is a rather important consideration.

Length of Time Apples May be Kept in Cold Storage. It is safe to say that any variety of apples may be kept as long as it is commercially desirable to do so. Late winter apples may be kept a year without difficulty; fall and early winter varieties, from two to four months. Canadian Fameuse of the previous season's growth were shown in good condition at the Dublin Exhibition in the month of August. Of course, only a percentage of those originally stored were sound at that time, and the circumstance does not prove that it would pay to keep the Fameuse to that date.

Cold Storage of Apples May be Overdone. The cold storage of apples might easily be overdone. It would be quite practicable, for instance, to pre-

serve any of the early fall apples if placed in storage at the proper time, for several weeks or even months, but it would not be good business to do so, because the trade would be shy of such varieties out of season. It would be unbusinesslike to attempt to carry inferior varieties into the season for better ones.

Season May be Extended. By degrees, however, the season for superior varieties might be considerably extended. The Rhode Island Greening is a good type of this class. The season for the Greening has been extended for six weeks or two months in the United States by means of cold storage, with the decided advantage that it misses the competition of cheaper varieties. The question of variety should be carefully considered in selecting a stock for cold storing.

The Function of Cold Storage. The proper function, then, of refrigeration in connection with our fruit trade, is two-fold. First, the rapid chilling of early apples and tender fruits, and their preservation in transit; and second, the storage and early checking of the ripening process in late apples intended for long keeping. When the cold weather comes on, natural temperatures can be utilized, but the damage is done before that time arrives, especially in those seasons when warm weather prevails late into October or November.

In these two fields, there is a great opportunity. Of course, there is always the further advantage of being able to carry surplus stocks over a period of glut in the market. There is particular need for cold storage in those warmer localities where late apples approach more nearly the stage of full ripeness on the trees. There is this to be said also, that apples which are well matured and highly colored keep better in cold storage than greener and more immature ones do.

But it would be a mistake to suppose that all Canadian apples require cold storage. In the cooler districts at least a portion of the late or slow maturing varieties may be preserved for early marketing if properly handled in ordinary frost-proof warehouses. While cold storage would lengthen the season of all apples, the gain in value would not be equal to the expense in all cases.

As one whose duty it is, as a public officer, to give all reasonable encouragement to the use of cold storage, I feel that it would be unfortunate if these things were not well understood and clearly recognized before there is any large expenditure made in this connection.

Packages in Cold Storage. The question of package is of some importance in the cold storage of apples. In the case of the early varieties, for which quick cooling is important, the box package, on account of its smaller size, and, therefore, greater extent of surface as compared with bulk, and the openings at the edges, undoubtedly facilitates the attainment of the object in view. With later varieties for which quick cooling is not so important, the barrel carries no serious objection.

Wrappers and Cold Storage. All apples will keep better if wrapped in paper. The wrapper helps to prevent the bruises which may result from the handling and the pressure of tight packing, and it also prevents the spread of mould spores or other forms of decay from one apple to another. The wrapper offers the further advantage that it prevents, to some extent, the collection of moisture on the surface of the apple when it is changed from a low temperature to a comparatively high one.

The wrapper is obviously more useful on early and tender varieties than on later and firmer ones. Circumstances and labor resources must guide the individual in determining how far it will pay to carry the matter of wrapping.

Pre-cooling. The so-called pre-cooling of fruit, vegetables, or other pro-

duce, consists of an arrangement whereby the circulation of air which is chilled with a refrigerating machine, is directed through a loaded car by means of temporary and adjustable pipes or ducts. That is to say, the car is placed in the same relation to the refrigerating machine for the time being as an ordinary chamber in a cold storage warehouse.

My attention was first drawn to this system by the work of the Bureau of plant industry of the United States Department of Agriculture in California where they experimented in connection with the shipment of citrus fruits and vegetables in conjunction with the Pacific Fruit Express Company, a subsidiary company of the Southern Pacific Railway System, and by correspondence with Mr. L. A. Roy, of Chicago, who is interested in the promotion of the idea.

Two years ago, I fitted up the necessary connections at the St. Catharines Cold Storage and Forwarding Company's warehouse, but we were never able to give it a fair trial on account of the small size of the plant. The partial cooling which was effected was undoubtedly of some benefit, but hardly worth the time and trouble. It would take too long with the six-ton machine in use there. The pre-cooling of a car load of warm fruit in addition to the chilling of the car itself, which is a considerable item, takes about two tons of refrigeration, and as it should be accomplished in about four hours, it is equal to a machine capacity of 12 tons in 24 hours. If two cars were to be cooled at one time, it would require a plant of at least 25 tons capacity. Further, in order to be effective, the cold blast should have a temperature of not more than 20 to 25 degrees, and that precludes the possibility of using the same circulation in the warehouse where the temperature in fruit rooms must not go below 32 degrees. As long as the fruit in the car is warm, the cold air blast can safely be reduced to several degrees below the freezing point, but this is not permissible in a warehouse where the contents are already reduced to the minimum of safety.

During the past summer I had an opportunity of inspecting the large plants which have been erected by the Southern Pacific Railway in California. They have spent a million and a half dollars on two plants, one at Roseville in Northern California, and the other at Colton, in the southern part of the State. I would like to take this first public opportunity of saying that I received every courtesy at the hands of the various officials, from the Chief Trade Director down to the superintendent of the works, and I was given every possible facility to get what information I wanted.

These two plants are at interior points where the traffic converges for the overland journey. The one at Colton has 500 tons of refrigeration and can handle a whole train of cars at one time. In addition to the cooling facilities, there is a large equipment for making the ice with which to fill the bunkers of the cars.

You will observe that these cooling facilities are being provided in California by the railway company, and I am of the opinion that it properly falls to them to do it. In the first place, they benefit by the saving of ice, and a plant erected by the railway can be made to serve a whole district at very much less cost than the aggregate cost of erecting and operating a number of smaller plants. Moreover, it should be the business of the railways to carry the freight which is entrusted to them in the best possible manner, and if pre-cooling comes to be one of the necessary aids to the transportation of Canadian fruit, it seems to me that it is up to the companies to furnish it.

I can see the possibility, or I might say the practicability of operating a plant, say at Hamilton, to serve the district between Niagara and that city in

connection with western shipments. With some system of prompt movement of the cars from loading points to the cooling centre, they could be started on their overland journey without serious delay and with the best possible chance of reaching their destination with the contents in good condition.

It will be evident from what I have said that pre-cooling does not differ in principle from the cooling which is effected by placing the goods in a cold storage warehouse, but if it is conceded, and it certainly may be, that immediate and rapid cooling is important in the handling of perishable produce, then it must be admitted that, under certain circumstances, pre-cooling has decided advantages. One advantage over cooling in a warehouse is that it saves handling the fruit and the consequent exposure to warm air while being transferred from the warehouse to the car, a thing to be avoided as much as possible. With proper equipment, a car load of fruit may be cooled in this way as much in four or five hours as it would be in two or three days with ice only in a refrigerator car. A more rapid circulation of air at a much lower temperature than can be secured with the use of ice removes the heat in a comparatively short time.

I have dwelt at some length on this matter of pre-cooling, because it is one which has attracted some attention, and there is likely to be more or less enquiry concerning it.

The Cold Storage Warehouse. Any treatment of this subject would be very incomplete without some reference to the cold storage warehouse. I am in favor of making the cold storage of fruit a special business, as a rule. Large general cold stores at important centres should have provision for handling apples and other fruit, but in many cases, it will be more economical and more satisfactory all round to have warehouses built and equipped for the handling of fruit only. Cold storage is needed for fruit in localities where little or no other kind of produce will be offered. Non-freezing temperatures only are required and that chiefly during the coolest part of the summer and in the winter months. This permits of lighter insulation and lower refrigerating power than is necessary for general storage where freezing temperatures must be provided.

The period of fruit storage covers only a part of the year. A special fruit cold storage need be operated only when fruit is in storage.

Construction of the Warehouse. There are, of course, many different plans on which such a building may be constructed and different materials may be used for insulation. I shall not attempt to describe all of them, but I shall endeavor to give you some idea of the kind of a warehouse which would be suitable for a co-operative fruit association, because it is chiefly in connection with these organizations that I expect to see cold storage applied to the fruit trade in Ontario.

If the warehouse is to be on a railway siding, the ground floor should be on the level with the car floor, with a basement beneath, and as many floors above the ground floor as may be considered necessary. My preference would be, except in the case of very large warehouses, to have only a ground floor and basement with an attic for the storage of boxes, etc. Such a warehouse, 75 x 45 feet, with a one-storey addition for machine room and office, would be sufficient to store between 7,000 and 8,000 barrels of apples, or the equivalent of about 10,000 barrels if packed in boxes. Fig. 1 is a diagrammatic longitudinal section of such a warehouse.

The ceilings need not be over 8 feet high to accommodate five tiers of barrels, which is high enough for piling.

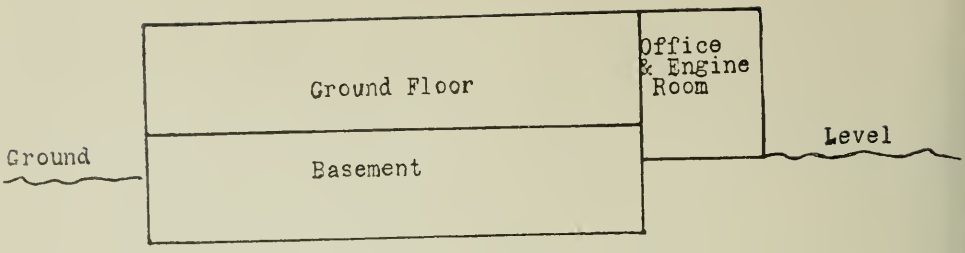


Fig. 1.—Diagram of Section of Cold Storage.

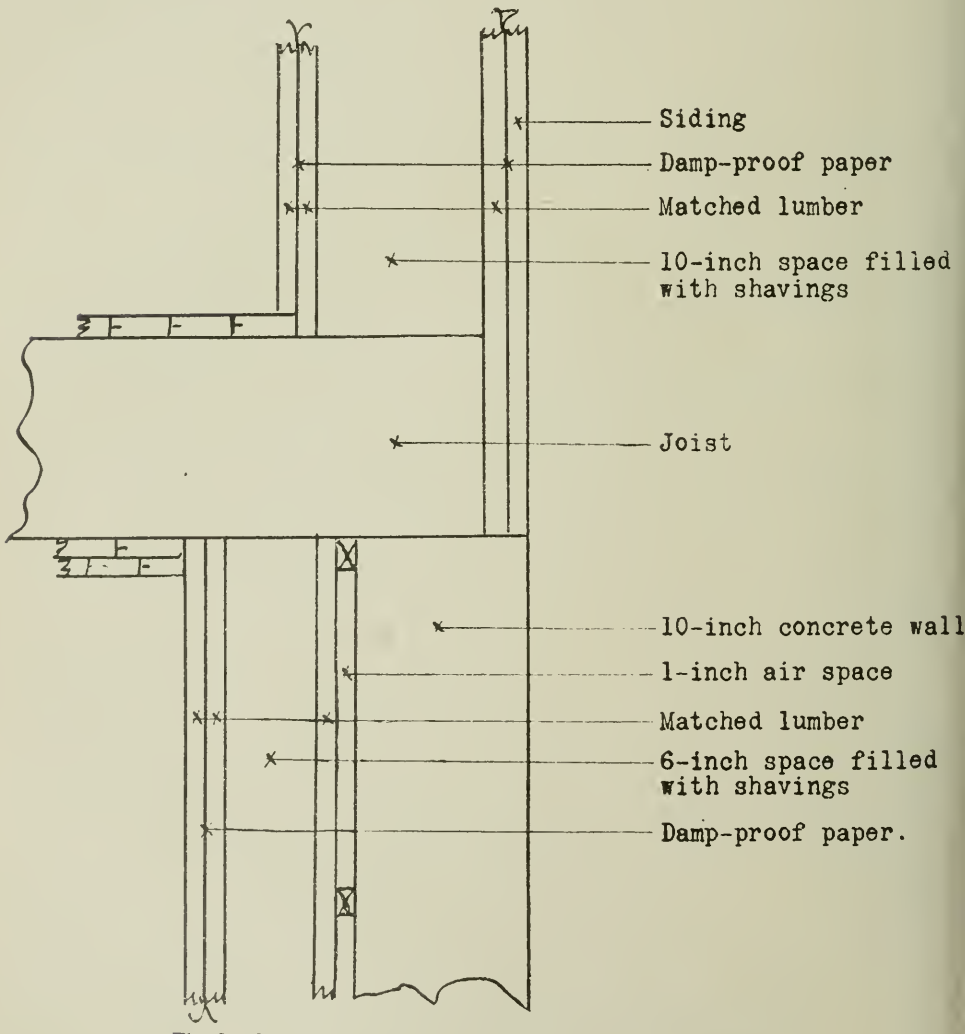


Fig. 2.—Section of wall at ceiling of basement of Cold Storage.

Tar paper

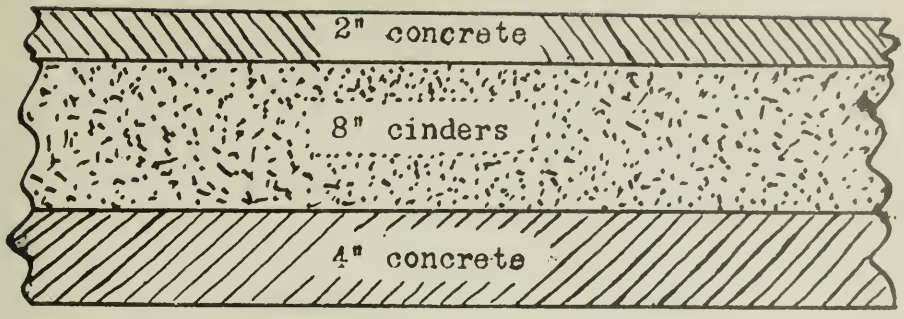


Fig. 3.—Section of floor of Cold Storage.

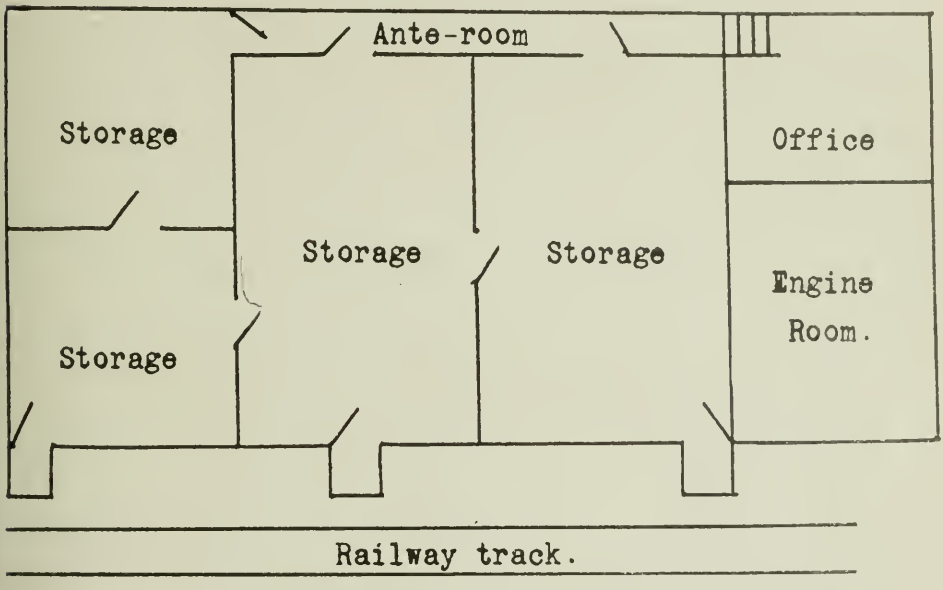


Fig. 4.—Arrangement for ground floor of Cold Storage.

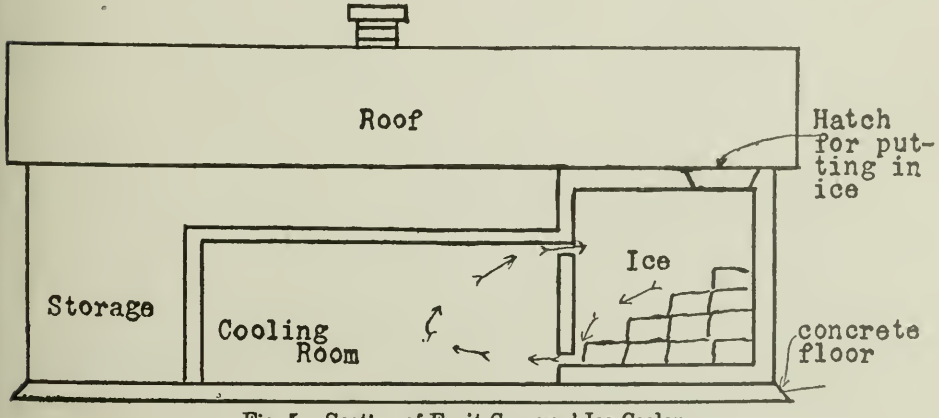


Fig. 5.—Section of Fruit Growers' Ice Cooler.

I think I may take it for granted that the cheapest possible construction, consistent with reasonable efficiency, is the one which will be most popular. I cannot say that I agree with the policy which prompts the erection of more or less temporary buildings in connection with an industry so well established, and with so much promise for the future as fruit growing has, but as we are dealing with a condition rather than a theory, I am prepared to take things as I find them.

For the basement of this building, there is probably no cheaper or better material than concrete. The upper storey can be built of wood more cheaply than with other materials, because the structural parts can be combined with the insulation material in the most economical manner. Planer shavings make the best and by far the cheapest insulation, for wood construction. The empty air space, miscalled a dead air space, is an obsolete form of insulation. Absolutely dead air is, next to a vacuum, probably the best insulator known, but experience has taught us that air in wall spaces is not "dead," and that it circulates within the space and carries heat from one side to the other. Hence the practice of filling these spaces with some light, non-conducting material like shavings, which confine the air on the same principle as the air is confined in the fur of animals, or in our clothing, to prevent the passage of heat. Saw-dust is sometimes used for filling spaces, but it should not be unless it can be kiln-dried, because it normally contains a great deal of moisture. It is always cut from green or water-soaked timber, and this moisture destroys its insulating value and at the same time encourages the growth of moulds which soon give rise to mustiness. Dryness is the first principle of successful insulation and must never be overlooked. Think of the difference between dry and wet clothing on a cold day.

Considering cost and efficiency, I would recommend the following combination for the walls of a building of this class. For the basement, a 10-inch concrete wall, water-proofed on the outside and finished on the inside with a one-inch air space, one course of matched lumber, a six-inch space filled with shavings and two courses of matched lumber with damp-proof paper between. The object of the narrow air space is to prevent moisture from getting into the insulation from the concrete wall. For the upper storey, 2 x 4 inch studs covered on the outside with one course of matched lumber, two-ply of damp-proof paper and either metallic or wood siding; a space of 10 inches filled with shavings, finished on the inside with two courses of matched lumber with two-ply of damp-proof paper. This inside sheathing would require an additional row of 2 x 4-inch studs, which should be placed zigzag with the outside row. The ceilings will be sufficiently insulated with the spaces between the joists filled with shavings.

A very important precaution in the construction of the concrete wall is to give it a coat of pitch or other waterproofing on the outside, especially below the surface of the ground.

A section of the wall and ceiling of this warehouse which we are trying to describe would have the following detail. (Fig 2.)

The basement floor is an important detail of the construction, and probably the most difficult part to insulate, because we have to contend with the moisture from the earth. Cold storage engineers are not agreed as to the best combination of materials for ground insulation. Wood in any form is unsuitable, owing to the tendency to absorb moisture, which destroyes its insulating value and promotes decay. Shavings, then, are out of the question. Impregnated sheet cork, laid between two layers of concrete, or asphalt and concrete, are being used in some of the more expensive plants. I have recommended for cheaper construction, such as we are considering, a combination as follows:

First a 4-inch layer of concrete, then 8 inches of clean dry coal cinders, well rolled or rammed, a layer of tar paper and a finishing surface of 2 inches of concrete. A course of hollow brick (square tile) can be substituted for about half the depth of cinders. The tar paper is put over the cinders to prevent the wet concrete from filling the air spaces in the cinders. This combination will be improved by coating the first layer of concrete with roofing pitch to keep the earth moisture from the cinders. It is the cinders which provide the insulation. Concrete is a poor insulator. Fig. 3 gives the details of such a floor.

As for the arrangement of the rooms much will depend on circumstances. In most cases, the basement would be as well in one room, or two at the most. For the ground floor, which would be used for cooling small lots during the active shipping season, the division as shown in Fig. 4 is only a suggestion.

A building such as I have described should be erected and equipped with refrigerating machinery at a cost, exclusive of site, of from $1.50 to $2 per barrel of capacity on a total of $12,000 to $15,000.

I shall not dwell any longer on this point, because I intend to have detailed working plans and specifications made before next season and blue prints of these will be sent to anyone who applies to me for them.

Ice Storages on Farms. So far, we have been dealing with mechanical refrigeration and central storage, and I propose to finish, in a very few words, with a suggestion concerning small iced cooling rooms for the use of individual growers and to be located in or near the orchard. (Fig. 5.)

I believe that a small room where berries and tender fruits could be cooled, held over Sunday, etc., would be a very useful adjunct to many fruit farms. I would not advocate a low temperature for such rooms, possibly not lower than 50 degrees, because of the damage which would result from "sweating" when the fruit was removed for shipping if lower temperatures were employed. At a temperature of 50, it would be practicable to have a cement floor and to get some cooling from that source which is a great advantage. The walls should have one course of matched lumber and siding on the outside, with damp-proof paper between, and double boarding and paper on the inside, with a space of 12 inches between the inside and outside sheathing to be filled with shavings. About one-third of the building should be set aside for the ice chamber with a partiton between the ice chamber and cooling room having the same insulation as the outside walls. An additional course of matched lumber on the inside, making a one-inch air space, is advisable for the ice chamber. The air space in this case is to prevent moisture from the ice penetrating the insulation. The floor of the ice chamber should be constructed in the same manner as the floor in the basement of the cold storage (see Fig. 4), with a slope of one inch in four feet to a gutter at one side to provide drainage from the melting ice. The drainage outlet must be trapped to prevent the passage of air. The floor of the ice chamber should be covered with a wooden grating on which the ice will rest. No covering or packing material is used on or around the ice in such a chamber. Provision is made by means of openings in the partition between the ice chamber and the cooling room, at the ceiling and near the floor, for the circulation of air through the cooling room and over the ice. As the air is chilled, it deposits some of its moisture on the surface of the ice, thus making a fairly dry storage. Neither the ice chamber nor the cooling room should be ventilated. The air is changed sufficiently by the occasional opening of the door. Ventilation means the introduction of warm moisture-laden air, which causes dampness. The circulation over the ice tends to keep the air purified.

It is permissible to have small windows in the cooling room, but they should be located at the ceiling and have at least double sash each double glazed. There should be an ante-room which can be used for storing empties, tools, etc.

Fruit growers will be able to determine individually whether one of these cooling rooms would be of use to them or not.

RESOLUTIONS.

The following resolutions were then presented and adopted:

1. This Association heartily recommends the extension of the co-operative system of marketing fruits amongst the fruit growers of the Province of Ontario in as much as this system has proved of immense value during the past few years.

2. This Association desires to express its appreciation of the value of the work done by Mr. McNeill, Chief of the Fruit Division in the crop reports issued during the season of production. It strongly recommends, however, that these reports be made more comprehensive so as to cover more fully than they do now crop conditions in other countries as well as our own and that they may be issued more promptly and at fortnightly instead of monthly intervals during the principal part of the season. Further that the Dominion Government be requested to adopt some method whereby the fruit growers may be able to ascertain more definitely the acreage of the different fruits planted in the Dominion, and also a statement of the output from year to year.

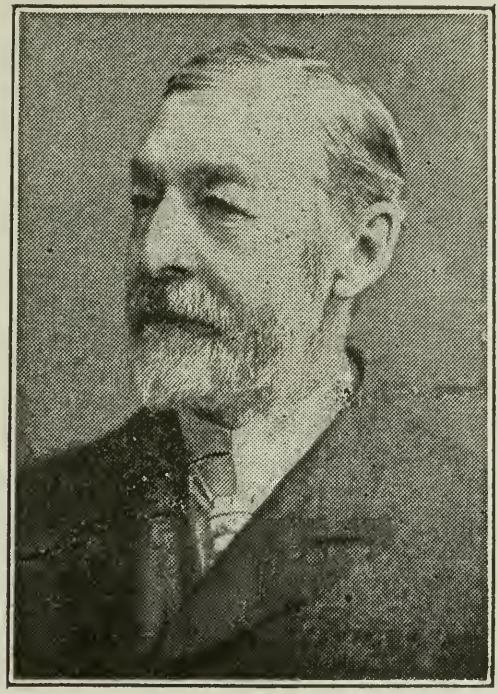
3. This Association recommends that a committee be appointed, of which the Secretary shall be one member, to consider the advisability of using liberal space in the daily papers of Toronto for advertising from time to time during the season of heavy fruit production. A free use of advertising space when a rush of any one variety of tender fruit is coming in with a view of informing the city householder of the expected arrivals should be the means of greatly increasing the buying and thereby relieve the glut which now occasionally takes place.

4. This Association recommends that the proposal of Mr. Graham that measures be taken with a view of securing from railways the same assembling privileges for apple shipments to the west that are now available for export be strongly approved and that the transportation committee be urged to act accordingly. Also that the demands for lower rates on shipments by express referred to by the same committee be vigorously pressed and that an early order by the Railway Commission be called for.

A SHORT SKETCH OF THE LIFE OF MURRAY PETTIT.

By F. G. H. Pattison, Winona.

By the death of Mr. Murray Pettit, at the age of 67, on the 3rd of March, 1910, at his home in Winona, the Ontario Fruit Growers' Association, in common with fruit growers all over the Province, has sustained a very heavy loss. In the affairs of the Association Mr. Pettit took a very prominent part, having been a member since 1872. In 1885, at the annual meeting held in the town of Wingham, he was elected director for District No. 7, which comprised the counties of Wentworth, Wellington, Waterloo and Halton. This office he held for a great many years, and at the annual meeting held at Orillia in 1894, he was elected president —the highest office in the gift of the Association.



The Late Murray Pettit.

Mr. Pettit filled this office with honor to himself and great benefit to his brother members for a period of two years. At the annual meetings held in different parts of the Province, and then centralized in Toronto, Mr. Pettit was a very prominent figure, and he from time to time contributed very valuable papers and information on the different branches of fruit growing, with which he was so well acquainted. He was also a large exhibitor of fruit, especially grapes, at the different shows held in conjunction with these meetings, and his services were in great demand on the various committees appointed by the Association.

Mr. Pettit belonged to a family of United Empire Loyalists who came over from the United States to Canada shortly after the Declaration of Independence,

and settled on the south shore of Lake Ontario at Winona, then called Fifty Mile Creek. As a reward of his fidelity to the English Crown his grandfather, Mr. John Pettit, received a free grant of 468 acres of land in the township of Saltfleet, county of Wentworth, and there, on March 13th, 1843, Mr. Murray Pettit was born.

On reaching manhood Mr. Pettit took up farming upon the old homestead, and in the year 1872 began to take up fruit growing as a special business, in which he was destined to be so pre-eminently successful. His first experience was in peaches, of which, in the year referred to, he planted an orchard of about eight acres. From this he obtained a few crops of excellent peaches, but in 1879 that fell disease called "Yellows" made its appearance and soon destroyed the orchard. Undaunted by this mishap, however, Mr. Pettit took up other branches of fruit growing—apples, pears, plums and grapes, and became particularly distinguished as a grape specialist.

In the seventies Mr. Pettit had already begun planting grapes, chiefly Concord, but the introduction of the Niagara grape into the district by the Niagara Grape Company, of New York State, in the year 1880, gave a great impetus to the grape industry, and Mr. Pettit was one of the first to plant Niagara grapes, paying $1.50 each for the young vines, notwithstanding which he found it a very profitable venture, as for some years these grapes sold for high prices, and Mr. Pettit made a profit of from $1.00 to $2.00 per vine annually.

Encouraged by this success, Mr. Pettit extended his vineyards rapidly, and at the time of his death had over thirty-five acres in full bearing, and was considered one of the leading authorities on grape growing. He had also twenty-five acres devoted to pears, apples, plums and some peaches. For some years Mr. Pettit experimented in the different varieties of grapes and other fruits on his own account, maintaining an experimental row of about 100 different varieties of grapes alone. Recognizing this fact, in 1894 the Ontario Government appointed him director of the Experimental Station at Winona, which office he held till his death. In this, as well as in everything else relating to the fruit industry, he was of great assistance to his brother fruit growers, being always ready to work for them in a most unselfish way. In every new movement for the advancement of the fruit industry he was in the van, and in 1884 he began spraying, being actually the third man in Ontario to use a spray pump. Mr. Pettit was director and then president of the local Fruit Growers' Association at Grimsby for a long period, and in 1884 was one of a deputation to the Ontario Legislature which secured the passing of the "Yellows" Act of that year, and he was appointed by the township council of Saltfleet as the first inspector of "Yellows" and "Black-Knot."

On the formation of the Niagara District Fruit Growers' Stock Company in 1880 he was chosen a member of the first directorate, and served on the board until the company voluntarily wound up business only a few days before his death, at which time he was president and had been so for some years.

In 1893, when Ontario astonished the world by its magnificent exhibition of fruit at the World's Fair, Chicago, Mr. Pettit was entrusted with the onerous duty of gathering up the fruit from this district and forwarding it to its destination. This duty he fulfilled in his usual efficient manner, and much of Ontario's success at the Fair was due to him. He also sent a fine collection of fruit to the Pan-American Exhibition at Buffalo in 1901, and was awarded a silver medal for the same.

Mr. Pettit was in great demand as a judge at the various fruit shows held at Toronto, St. Catharines and other places, and his decisions gave great satisfaction to both the public and the exhibitors. The writer had the privilege of assisting him in this work on one or two occasions, and willingly bears tribute to his great ability in this direction.

Shortly previous to his death Mr. Pettit was elected president of the Niagara Peninsula Fruit Growers' Association, the leading organization of the district at the present time. He was also one of the organizers of the Fruit Growers' Publishing Company, Limited, and was a director and vice-president of the company.

Nor was it only in fruit growing that Mr. Pettit obtained distinction. For several years he was a valued director of the Central Farmers' Institute. He served five years as reeve of the township of Saltfleet, and was elected warden of the county of Wentworth in 1899. In politics he was a lifelong Conservative, and took an active interest in all that belonged to the welfare of the party. He had been repeatedly president of the County of Wentworth Conservative Association, and only a few days before his death he was re-elected president once more. Nominations for both the Provincial and Dominion Houses had also been repeatedly tendered him.

Truly it may be said of him, as was said of King David of old, that a man full of years and honors has gone to his rest. Mr. Pettit was twice married, and leaves a widow and three daughters to mourn his loss.

REPORT

OF

FRUIT BRANCH

Department of Agriculture

ONTARIO

1909

Published by the Ontario Department of Agriculture, Toronto

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To the Honourable JOHN MORISON GIBSON, K.C., LL.D., ETC., ETC., ETC.

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the pleasure to present herewith for the consideration of your Honour the Report of the Fruit Branch of the Department of Agriculture for 1909.

Respectfully submitted.

JAMES S. DUFF,
Minister of Agriculture.

Toronto, 1910.

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REPORT OF THE FRUIT BRANCH

1909

To the Honourable James Duff, *Minister of Agriculture.*

Dear Sir,—I beg to transmit herewith for your approval my report of the work of the Fruit Branch of the Department of Agriculture for the past season. It will be noted from the expenditure, as given below, that the work of this Branch is expanding rapidly. Practically all of the appropriations voted by the Legislature were used in full and some special investigations were also carried out under the general vote of the Department of Agriculture for that purpose. A great awakening seems to be taking place along horticultural lines in Ontario, and we may expect increasing demands on this Department for aid in all branches of orchard work.

The expenditure for the ten months ending October 31st, was as follows:—

Grants to Provincial and district associations	$ 5,791.00
Grants to spraying associations and cost of inspection	3,975.41
Inspection of apiaries	2,841.50
Fruit exhibits	2,943.37
Horticultural Experiment Station maintenance	13,027.56
Horticultural Experiment Station expenditure on buildings	12,269.58
Maintenance of fruit stations	1,468.49
Orchard and nursery inspection, spraying experiments, etc.	3,875.54
Special orchard investigations	1,224.81
Apple packing demonstrations	278.85
Salaries	2,002.00
Office contingencies	955.32

A slight increase will have to be asked for in some of these items for the coming year to cover the extra expense entailed by the growth in the work.

Your obedient servant,

P. W. Hodgetts, *Director.*

REPORT OF THE FRUIT BRANCH

WORK OF THE FRUIT GROWERS' AND BEEKEEPERS' ASSOCIATIONS.

In addition to arranging for the entertainment of the American Pomological Society, a report of which follows, the Ontario Fruit Growers' Association has followed up this year's efforts by issuing another pamphlet entitled "Success in Apple Orcharding." This was very widely distributed through the officers of the Association, the members of the Legislature and the Department of Agriculture. Such was the demand for this little book that a second issue was found necessary.

The pamphlet treats of the various orchard operations, such as pruning, spraying, cultivation, manuring, thinning and packing by some of the most successful apple growers in the Province. The work was thoroughly practical and undoubtedly owes its success to this fact.

The Fruit Growers' Association again made a great effort to put up the best display of apples possible at the Horticultural Exhibition in November, a full description of which is given elsewhere in this report.

A very successful convention was held in November in Toronto and a very representative body of the fruit growers was in attendance. Several well known fruit growers from New York and Michigan were brought over to address the gathering.

Other lines of work were carried out, and that the Association continues to actively represent the fruit growers of the Province is shown by a decided increase in membership.

The Ontario Bee-Keepers' Association has again devoted a considerable portion of its time to the consideration of the foul brood situation in the Province. The appointment of additional inspectors has in most districts effected a decided improvement of the situation and it is hoped that before many years the disease will be materially checked, if not eradicated. An outbreak of the European Foul Brood in the eastern part of the Province has, however, caused some dismay among bee-keepers there as this type of the disease has done a great deal of damage in New York State and seems more virulent in its work of destruction. Further information in reference to methods of treatment, etc., will be found in the annual report of the Bee-Keepers' Association which is published by the Department.

Small grants were made by the Department to the Gardeners and Florists' Association, and to the Niagara Peninsula Fruit Growers' Association. The latter Association has expended its money for the holding of special fruit meetings in March of each year. These meetings have been well attended and addresses delivered, not only by the best local men, but also by prominent fruit growers from the United States. The Association is doing good work in organizing the fruit growers of the Peninsula, and is always active in taking up matters of importance to the industry.

Portion of box fruit exhibit at the meeting of the American Pomological Society, St. Catharines, 1909

THE AMERICAN POMOLOGICAL SOCIETY.

A special grant of $1,000 was made to the Ontario Fruit Growers' Association for the entertainment of this distinguished horticultural body which met in St. Catharines in September of 1909. The appropriation was used in providing excursions through various parts of the fruit section from Hamilton to the Niagara River and in showing the visitors the Agricultural College at Guelph. A large number of practical fruit growers, as well as experiment station men from all parts of the United States, were in attendance, and the five days' sessions of the Association were undoubtedly of great value not only to the visitors but to the fruit growers in the Niagara district. A great many of the latter joined the American Pomological Society for the benefits to be gained therefrom through the annual report and special reports issued from time to time.

Exhibit of United Counties of Northumberland and Durham at Ontario Horticultural Exhibition, 1909.

To show the visitors the fruit and vegetable resources of the district a special effort was put forth by the Directors of the Niagara District Horticultural Exhibition, which was open during the week of the convention, to make a finer display than usual of these products. The illustrations shown herewith will give some idea as to the results, which were indeed very gratifying to any resident fruit grower of the Province.

Special note should be made of the magnificent display of boxed fruit of all kinds put up by the St. Catharines Cold Storage & Forwarding Company, the largest co-operative association of fruit growers in the Province. This Association has been in existence for twenty years and has been very successful of late years in the shipping of fruit in car lots to the Canadian North-west.

A number of medals were awarded by the American Pomological Society to such exhibits as were worthy of special notice. These included among others the boxed exhibits mentioned above, a farm exhibit made by Mr. Albert Pay of

St. Catharines, an exhibit of preserved gooseberries shown by Mr. R. B. Whyte of Ottawa, a display of new varieties of apples by Mr. Macoun of the Central Experiment Farm, and an exhibit of fruits of various kinds preserved in jars by Robert Thompson for exhibition purposes.

ONTARIO HORTICULTURAL EXHIBITION.

The Exhibition of 1909 proved to be the most successful in the history of the Association. There was a record attendance from all points outside of the city, while the number of entries in the fruit section far surpassed any of the previous Shows. Perhaps the most attractive individual exhibit was that of the Norfolk Fruit Growers' Association put up in the form of an immense pyramid of apples. This Association deserves a great deal of credit for its unique display, and the men in charge certainly deserve all of the praise which they received through the Toronto press. Norfolk County, as a result of the exhibits in Toronto during the past three seasons, has obtained a reputation for fruit growing which has resulted in a large number of outsiders making their way there to engage in the business.

Other special exhibits worthy of mention were those of the Northumberland and Durham Counties, the St. Catharines Cold Storage Company, and the displays put up by the two provincial fruit experimenters, Messrs. Harold Jones of Maitland and A. E. Sherrington of Walkerton.

An exhibit of individual apples was made possible by the contribution by six of our leading fruit growers of a large sum of money for the prizes, which were $10 for first and $5 for second best apple in the following varieties: Spy, Baldwin, Greening, King, Fameuse, and McIntosh. A full description of each variety was given with a limit as to the size of the fruit. A large collection was shown which aroused a great deal of interest. The idea was to draw out a type of apple which would be a standard for each of the varieties called for.

Another section of the prize list called for box or barrel brands. A number of the best of these are shown in one of the accompanying cuts. A neat brand is something that every fruit grower and association should aim at, and a number of our prominent growers have already intimated that they will make a change for the coming season so as to secure something that will be attractive and at the same time neat in design.

The exhibit of boxed apples and pears was again the leading feature of the exhibition. There is no doubt that this package will prove to be a popular one in the local Ontario markets as a result of the displays made at this Show and at the Canadian National Exhibition. A record price for the boxed apples was obtained at the close of the Show, and these were distributed by one of our wholesale fruit firms among some of the best homes in the city. One of our largest associations is now planning to place some of their best product on the markets of Toronto, Montreal, Hamilton, Ottawa and Quebec as an experiment. If successful, there is no doubt that quite a big business will be worked up in this line which will replace the great bulk of the poor trashy apples which one sees in the stores of the city.

Display of fruit from farm of Mr. Albert Pay, St. Catharines, shown at meeting of the American Pomological Society.

Exhibit of boxed apples at Ontario Horticultural Exhibition, 1909. Single box competition.

CO-OPERATIVE SPRAYING.

The Department of Agriculture decided to continue the bonusing of co-operative spraying during the season of 1909. The terms regulating the granting of a bonus were somewhat altered so as to limit it to those farmers who had not previously taken up spraying or who had not benefited by any previous grant and also to those who had only started in 1908. In the inspection more stress was laid on the number of sprayings given and the thoroughness of the work. To show that the assistance of the Department was greatly appreciated there were eleven new societies that applied during the year with a total membership of 138. This does not include the new members of old associations. In this class there were 329 new members, making a total of 469 new members who had received no previous assistance from the Department out of a total of 689 applicants, or nearly 68 per cent.

The acreage was also greater, from 4,234 acres in 1908 to 5,697 acres in 1909, an increase of 1,463 acres. The greatest increase was in apples and peaches, while there was a slight increase in pears, cherries and grapes. The following columns show the acreage for the past three years during which the system of bonusing was in operation:—

——	Apples.	Peaches.	Pears.	Plums.	Cherries.	Grapes.	Total.
1907	1,478½	604	167½	334½	40	574¾	3,199¼
1908	1,740½	881½	236	518¼	98½	853½	4,328¼
1909	3,371	1,283	234	339½	80½	389	5,697

The following is a table showing the approximate amount of spraying material used in the past three years in these orchards:—

——	Copper Sulphate.	Sulphur.	Lime.	Paris green.	Arsenate of lead.	Arsenic.
1907	33,760	76,551	156,980	1,466	565	.....
1908	42,912	154,070	219,900	2,157	3,540	1,205
1909	51,484	200,000	301,400	015	8,119	2,200

The above figures indicate a great development in spraying amongst the fruit growers of the Province. A noticable feature is that arsenate of lead is gradually taking the place of paris green as an insecticide, and every indication points to a further decrease of the latter and a corresponding increase of arsenate of lead or arsenite of lime.

Exhibit of Norfolk County at the Ontario Horticultural Exhibition, 1909. Display put up by the Norfolk Fruit Growers' Association.

The commercial or concentrated lime sulphur was used this year to a very great extent, and many farmers who had previously used the home-made mixtures changed to the prepared. The chief reason for this is that it saves delay at a busy time. In plants where six or more growers get their mixture a great deal of time is lost in going to and from the central cooking plant and also in waiting their turn. This saving of time together with the general approval given by many experimental stations in the States and the energy of the companies in pushing the spraying material has caused a wide use of the commercial mixture. The results have been quite satisfactory in many sections. The apple growers commenced for the first time to use this material as a winter wash, and a lot of it was also used in the Georgian Bay as a summer spray. In fact the use of the lime sulphur wash, as a summer spray for apples, may become more common owing to the fact that Bordeaux mixture is liable to cause some russeting of the fruit as well as spotting of the leaves, the degree of injury depending largely on the humidity of the season during the early stages of the growth of the apple. Those growers who have secured good results from the Bordeaux should not yet abandon its use as a spray after the buds open. It has yet to be proved that the lime sulphur is a better fungicide, and there is a great deal to be learned in regard to the combining of the arsenical poisons with the mixture. It is stated, however, that paris green should not be mixed with the lime sulphur or burning of the foliage will result.

There are two firms manufacturing prepared lime sulphur in Ontario: The Chemical Laboratories, Toronto, and the Niagara Spray Company, Burlington. The former company started to manufacture for delivery in the spring of 1909, while the latter company built their plant in the fall of 1909. Previous to 1909 the material was shipped in from the United States, and owing to the duty was rather expensive to use. The price has dropped from $12.50 to $8.00 per barrel at the factory, and may be procured by Associations in car lots at still lower figures. A number of American brands are still offered in Ontario, but the two Ontario companies will handle practically all the trade this year.

Home Made Lime Sulphur.—This mixture continues to give uniform results and will always be used by the growers to a greater or less extent, but the co-operative method of boiling the mixture is apparently losing its popularity for the reasons previously stated. Small plants using direct heat are now being erected on the farms of all growers who have any extent of orchard. The quality of mixture produced has been more than satisfactory, while at the same time there has been a considerable saving in cost, which has been reduced to from 50c. to 60c per barrel, including all charges.

The use of the lime sulphur mixture is becoming more and more universal. Its value has been thoroughly demonstrated by the growers in the Niagara district as an insecticide for San Jose Scale, aphis, etc., and a fungicide for peach leaf curl, gooseberry mildew. The growers in south-western Ontario who have allowed the San Jose Scale to continue its ravages unchecked have commenced to spray with the mixture, and if they continue as have the growers in the Niagara district the results should be just as marked.

Bordeaux Mixture.—Bordeaux Mixture, despite the occasional injury resulting therefrom, is still used more generally than any other and so far has been proven to possess the greatest fungicidal properties. A great trouble at the present time is the lack of uniformity in the formulae. Many farmers continue to use a large excess of lime. Some of our most successful growers recommend

A bad sample of leaf-curl, a destructive peach disease which can be controlled by thorough spraying.

this practice, claiming that the excess of lime will cause the mixture to stick better and will itself kill some of the scale insects, especially the oyster shell. Extensive experiments prove, however, that an excess of lime is detrimental to the efficiency of Bordeaux mixture because the percentage of free copper is in ratio to the amount of lime used in the mixture. When moisture, dew or rain comes in contact with the Bordeaux it acts on the copper salts, setting free copper which acts on the spores of the scab and other fungus diseases. If, however, there is a great excess of lime, the copper is immediately taken up again, so hindering the action of the mixture. Growers should adopt some standard formula such as 3-3-40, and should pay more attention to the weighing of the ingredients, realizing that the use of more than what is required is a waste of money. There are a few growers who are using a formula that is made with the minimum amount of lime. It is prepared as follows: About 40 lbs. of stone lime is slaked in a barrel in the usual way and water added to make 40 gallons. After slaking, the whole mixture is thoroughly agitated for a few minutes and allowed to settle. The formula used is 2½ lbs. copper sulphate and 4 gallons of the clear lime water to 40 gallons of water. The tank is partly filled, the dissolved bluestone added, followed by the lime water and the whole mixture is made up to 40 gallons and tested with potassium ferrocyanide. Should the mixture show any discoloration more lime water is added. This type of Bordeaux has only been used on grapes, but the results have been satisfactory. The mixture is very fine and there is absolutely no clogging of nozzles.

Insects.

The Codling Moth is still the most injurious insect enemy of the fruit grower, and continues to damage a large percentage of the apples and pears, but in sections where the growers are realizing the value of thorough work and are becoming more informed with regard to the life habits of the insect we find that the injury from this insect is greatly lessened. Many of the most advanced growers have practically controlled it.

The Blister Mite is rapidly increasing in eastern Ontario. Every orchard east of Toronto was infested to a greater or lesser degree last year, there being some very bad cases where the leaves got quite yellow and dropped prematurely. However, the lime and sulphur sprayed just before the buds commenced to open gave splendid results and the growers in this section realizing the amount of damage that might be done by this pest will undoubtedly treat their orchards accordingly.

The Pistol Case and Cigar-Case Bearer were very prevalent in some sections, especially eastern Ontario.

Bud Moth continues to do considerable damage to young as well as old orchards.

The Apple Aphis was exceptionally bad throughout Ontario. Its appearance was very sudden and it did a tremendous amount of damage to the apple crop. Feeding on the young leaves and stems of fruit, it checked the growth of the fruit and as a result it was a common thing to find in almost every orchard bunches of useless, undeveloped apples.

The Tussock Moth appeared to some extent on the apples in western Ontario, but it is being kept well in check by the use of arsenical poisons applied late in the season.

The San Jose Scale is still very prevalent in south-western Ontario, but the growers have commenced to spray for it in many localities. In the Niagara district it was even better combatted this year than previously, and as lime and sulphur is now being used by nearly all the growers and the township inspection is becoming more thorough, that district has little to fear from this pest.

The Oyster-Shell Bark-Louse is very injurious in eastern Ontario, but the farmers having become more conversant with its habits are treating it successfully with lime and lye. Many orchards have been completely rid of the scale.

The Pear Blight continues to destroy a great percentage of pear trees, and this year did a considerable amount of damage to the young apple twigs also. This was especially noticeable between Oakville and Burlington.

The Apple Canker is still prevalent in eastern Ontario, but the apple growers knowing its appearance and treatment will soon have it under control. The treatment now generally adopted is to remove the injured or diseased portion of the tree and paint the wound with white lead. After the diseased portion has been cut away the wound should be thoroughly disinfected with a 1 per cent. solution of corrosive sublimate before being painted with the lead.

The Apple Scab was present as usual in unsprayed orchards, but owing to the more efficient spraying of our commercial orchards it is being kept in check there.

APIARY INSPECTORS FOR SEASON OF 1909.

The provisions of the Foul Brood Act were enforced last year by fourteen inspectors, an increase of six over the previous year. The names and districts of these inspectors are given herewith:—.

1. J. S. Schrank, Port Elgin; Bruce, and Huron.
2. D. Chalmers, Poole; Waterloo, and Perth.
3. Jacob Alpaugh, Eden; Wellington, and Gray.
4. W. A. Chrysler, Chatham; Lambton, Kent, and Essex.
5. Jno. Newton, Thamesford; Middlesex, and Elgin.
6. Jas. Armstrong, Cheapside; Oxford and Norfolk.
7. Morley Pettit, Jordan Harbor; Brant, Wentworth, Halton, Haldimand, Lincoln, and Welland.
8. H. G. Sibbald, Claude; Simcoe, Dufferin, and Peel.
9. J. L. Byer, Mt. Joy; Ontario, York, Victoria, and Durham.
10. W. Scott, Wooler; Peterborough, Northumberland, Hastings, and Prince Edward.
11. M. B. Holmes, Athens; Lennox and Addington, Frontenac and Leeds.
12. A. A. Ferrier, Renfrew; Lanark and Carleton.
13. J. Leslie McNaughton, St. Raphael West; Russell, Prescott, Glengarry.
14. Homer Burke, Tayside; Grenville, Dundas, and Stormont.

Perhaps no one part of the work has shown such rapid growth as has taken place in the action of the Department for the suppression of disease among bees. For a number of years one inspector was supposed to cover the whole Province. In 1907 the Department, after consulting with the Bee-Keepers' Association, decided to make a change in the inspection system. The Province was subdivided and six inspectors appointed. At the close of the year their reports

Exhibit of the Fruit Branch at Canadian National Exhibition, Toronto, 1909

Exhibit of the Fruit Branch at the Canadian National Exhibition, Toronto, 1909

showed that foul brood was present in a great many of the apiaries. To properly cope with the situation it has been found necessary to rapidly extend the field of inspection until during the past season, as shown above, the Province was divided into fourteen districts with a man in charge of each. In addition Mr. Morley Pettit of Aylmer West was appointed to the position of Provincial Apiarist with the idea of encouraging still further the care of bees and the production of honey. Mr. Pettit was given an experimental apiary at the Horticultural Station at Jordan Harbor, and provided with considerable equipment for his work. At the close of the season last year it was felt that better work could perhaps be accomplished from the Agricultural College at Guelph, to which the apiary and experimental work has been transferred. A small bee yard will still be kept at Jordan Harbor for experiments with the fertilization of fruit blossoms.

It would be of decided advantage to the fruit growers of the Province if small bee-yards could be maintained throughout the fruit districts. At the present time there are fewer bees in the Niagara Peninsula than in any other section. This is, however, one district above others where their presence is needed by the fruit growers, as shown by those orchards in which bees are kept. This has been very noticeable during the past few seasons, as owing to the cold, wet springs there has been a limited time for the fertilization of bloom. If the bees are present right in the orchard they will work on the blossoms during the limited time between showers and cold weather when the blossoms are in shape for the fertilization of the pistils. A colony or two of bees, if properly looked after, will prove of immense value in the setting of fruit.

CANADIAN NATIONAL EXHIBITION.

This year the exhibit of the Fruit Branch was combined with that of the Agricultural College, the Agricultural Societies, the Corn Growers' Association and the Colonization Branch to make one large agricultural exhibit for the Province of Ontario. Owing to lack of room the fruit exhibit was not made as large as in 1908. It was found necessary to cut out almost entirely the exhibit of boxed fruits. It is hoped that in 1910 it will be found possible to again make such a display, so that we can compare our fruits with those from British Columbia, which were shown altogether in the packages.

The exhibit as shown consisted of the best varieties of fruits which were ripe during the time of the Show. The display consisted of peaches, plums, apples and pears, which, owing to their perfection at that season of the year, aroused a great deal of favorable criticism. Much interest was shown by visitors and considerable information regarding fruit growing was imparted to those who inquired about the same. A large placard giving the percentages of the various fruits raised in Ontario read as follows:—

ONTARIO PRODUCES 75 PER CENT. OF ALL FRUITS GROWN IN CANADA.

60 per cent. of the PLUMS.
70 " " APPLES.
80 " " SMALL FRUITS AND PEARS.
99 " " PEACHES AND GRAPES.

The tendency has been, on the part even of our own people, in the past to belittle Ontario fruit growing and to claim great things for other provinces. The facts as given above surprised a great many people. It would seem necessary for Ontario to adopt some of the up-to-date advertising methods for its fruit industry as followed in the western states.

WINNIPEG EXHIBITS AND THE WESTERN MARKETS.

The Fruit Branch was again represented by an exhibit at the Winnipeg Industrial Exhibition held in July. Boxed apples in quantity were held over from the previous season and proved a very attractive addition to the Show. The standard varieties for winter markets were shown as well as some varieties that were out of season. The McIntosh Red proved to be one of the best keepers that we have put into storage. Other varieties shown were Cranberry, Spy, Canada Red, Stark, Ben Davis and Baldwin.

A leading feature of the exhibit last year was the display of small fruits and cherries. Encouraged by the favorable shipments of the previous year much larger quantities were shipped out in 1909. These were received daily, and the previous day's shipments were then retailed to visitors at a low price. In this way the exhibit was maintained in fresh condition until the close of the Show. Cherries, raspberries, currants, American and English gooseberries arrived in excellent condition. A nice display was also made of tomatoes, cucumbers, early cabbage and other vegetables which are now going forward from Ontario to the western markets.

The western markets are undoubtedly to be of immense importance to the fruit growers of this Province from now on. The growth of the trade westward in fruits has been phenomenal, as shown by the shipments from the Niagara district alone in tender fruits last year. The following figures show an interesting comparison:—

From the entire district to Western Canada:

1909	500 cars.

From St. Catharines Cold Storage Company to Western Canada:

1904	1 car.
1909	125 cars.

In addition to these freight shipments very large quantities went forward from the middle of July by express, and from reports received these arrived in excellent condition and brought fairly good prices.

The St. Catharines Cold Storage and Forwarding Company after considerable hesitation, decided to attempt the shipment of strawberries to the Winnipeg market in carload lots. Most of the growers interested were interviewed personally by the manager of the Association and by the Director of this Branch in regard to the stage of ripeness at which the berries should be picked. Three cars were made up and sent forward—one by freight under refrigeration and the other two by express in what is known as the "blower car." This latter car is cooled

when the car is in motion by the pressure of air through a large number of hoods on the roof of the car. The returns as given by the Manager of the Association were as follows:—

"I desire to give you some details *re* the strawberry shipments to western Canada, as your Department took an active part in helping the growers to get together the three cars of strawberries sent forward from St. Catharines. Had it not been for the help given by the Department of Agriculture in securing information as to the condition in which the southern and western berries are forwarded we would not have been successful. The growers are very grateful and feel that the venture was a success, first that the car sent from here by freight on June 26th arrived in good condition and netted an average of $1.51 per crate, while berries shipped the same day to Toronto only netted from 70c. to $1.04 per crate. The car sent on June 28th by express netted $1.24 per crate, while Toronto berries the same day only averaged $1 per crate. We had to pay at the rate of $5 per cwt. to get the express car shipped June 30th from St. Catharines and sent via Welland and Hamilton. The car got into Winnipeg too late to sell to advantage before Sunday. We still had the berries sell fairly well. Following these shipments through advices received from you while in Winnipeg our Association have shipped about 2,000 baskets of cherries and a lot of red currants, these going through in good condition, demonstrating the fact that our tender fruits can be shipped safely if properly packed. We also have many inquiries from parties who saw the Ontario exhibit at the Winnipeg Exhibition."

First car shipped by freight to Winnipeg via Chicago, June 26th.
Lowest price received $2 per crate; highest price $3.05 per crate.
Second car shipped by Dominion Express via boat to Toronto, June 28th.
Lowest price received $1.82 per crate; highest price $2.90 per crate.
Third car shipped by Dominion Express in ventilated car from St. Catharines via Welland and Hamilton, June 30th. Lowest price received 90 cents per crate; highest price $3.

Owing to the arrival of the freight car on a holiday the berries had to be sacrificed, and the returns did not cover much more than the cost. The Association, however, feels satisfied that our berries can be successfully transported to this market, and intend the present year to follow up their previous attempt by putting in some carloads of the earliest berries. Other associations will likely follow the same course this year.

From observation made while in the West both by Mr. Thompson of the Cold Storage Company at St. Catharines and by other parties it would seem necessary for our growers to adopt a different box and crate for berry shipment. The minimum load in a car will also have to be reduced as it was found that where the crates were piled to any great height in the car the top layers were almost invariably moulded and consequently sold for a low price. One carload which was sent last year from Jordan Station to Winnipeg was over-loaded and not iced until some time after the berries were placed in the car. As a result it reached Winnipeg in bad order and was condemned by the city health authorities.

The past season a number of new associations were organized in the Niagara district for the better handling of fruit for the western markets. As a result it is likely that very large quantities of our tender fruits will be shipped through to the west the coming season. It would certainly be advisable for both associations and dealers in that section to come to some agreement as to the proper distribution of the shipments or there is likely to be a tremendous glut of fruit

in the large centres and a scarcity in the many smaller towns and villages surrounding these cities. Such a glut was witnessed last year in connection with the grape shipments with a consequent falling in prices almost below the cost of raising the fruit. That this market will undoubtedly take a tremendous amount of good fruit is true, but our shippers will have to watch carefully both the distribution and the quality until Ontario has regained her reputation in the west.

ONTARIO FRUITS IN EUROPE.

Ontario made no provincial exhibits at any of the Old Country shows the past season. It was decided by the Government, after special investigation, that more good could be obtained by keeping up a permanent exhibit in London than by showing a great quantity of fruit for a few days either at the Royal Horticultural Society Show or at some of the other large exhibits throughout the country. Owing to the changes made in the London offices of the Ontario Government, which are now situated on the Strand, a great deal of advertising can be obtained by the keeping up of an attractive window display of fruits and other Ontario products. With this idea in view the Fruit Branch sent over in storage 100 cases of our best varieties of apples. These will be on display there by the Colonization Branch until the arrival of this year's crop of early apples. In addition to the London shipment 15 cases of apples were also sent to Italy. Owing to the establishment of a direct steamship line from Italian ports to Canada it was thought desirable to endeavor to attract to the country some of the better class of Italian laborers.

EXPERIMENT STATIONS.

The usual appropriations for experimental work in horticulture were made by the Legislature. The experimenters in charge of the work report in full in the last part of this report. The expenditure on capital account for the station at Jordan Harbor was considerably less than the year 1908, as the larger buildings were practically completed. The administration building, superintendent's residence and teamsters' cottages were finished early in the year 1909, including the heating, lighting and plumbing. The greenhouse was completed, but owing to a very severe storm part of the work had to be done over. However, the outfit is now in good shape. The cottage on the lake front was entirely remodelled, so as to accommodate some of the additional help needed on the farm and for which there is no proper boarding house in the vicinity. An appropriation of $550 was expended in the construction of a breakwater to prevent any further damage by the washing away of the soil on the lake front. A lighting plant was installed to light the main buildings on the farm.

THE SUMMER INSPECTION OF NURSERY STOCK.

During the past summer the Department took up the systematic inspection of all the nursery stock for San Jose Scale and other insects and fungus diseases. This work had not been carried out since the retirement of the first provincial inspector of San Jose Scale, Mr. George E. Fisher, in 1903. It was found, however, that the scale was on the increase in and around some of the best nurseries

and that a thorough inspection was necessary. Four experienced men were engaged on this work from early in August to the end of November with instructions to make an examination of all stock, keeping an accurate record of insects and diseases found and to make notes on the general conditions of the nurseries and their surroundings. This was done in order that the Fruit Branch should have a definite idea of the existing conditions in respect to the nurseries of the Province, thus enabling them to give the nurserymen any assistance in their power in cleaning up infected surroundings and at the same time protect the interests of the fruit growers from the spread of pernicious insects and fungus diseases by means of infected nursery stock. It is hoped to make such inspection annually from now on.

In this work our inspectors found that a great many of the orchards in the vicinity of nurseries were badly infested and that in some instances very little was being done to eradicate or keep the scale in check. In many cases the sources of infestation in nurseries were undoubtedly these orchards. With such constantly present and the lack of proper and effective treatment by their owners, it was forcibly impressed upon the Department that in order to protect the fruit grower and the nurserymen, special attention must be given to these orchards by the Provincial Inspector. The San Jose Scale Act gives this Branch direct power to act in such cases, and appreciating the great danger from dissemination of the scale into uninfested sections through nursery stock, they intend to do everything in their power to lessen the probability of such infection. Such inspection of orchards in conjunction with the fumigation and the summer inspection of the nurseries will practicaly insure clean trees for the grower to start out with.

The following report regarding insects and fungous diseases was submitted to the Department by the Inspectors, Messrs. R. C. Treherne, R. W. Bartmann, Harry Arnold and N. Foster.

Insects.

1. San Jose Scale, *Aspidiotus perniciosus, Comst.*—But few nurseries can boast that they are completely free from the attacks of this pernicious insect. For the reason that birds are very largely instrumental in the spread and dissemination of this pest, it is almost impossible to certify any nursery free from attack for an extended length of time. It is peculiar that often, and indeed it appears to be general, that but one tree in a row would be completely encrusted from the twigs to the ground and yet no sign of scale would be found on nearby or neighboring trees, unless possibly these be touching. Presumably the reason for this is that a bird was instrumental in transporting the insect from one place to another and in choosing a nursery tree to perch upon at termination of flight left one or more insects on the crotches of that tree. The bird probably flew some distance before again alighting. The female insect, being of course wingless and not adapted to travel, consequently becomes localized. In the case of a group or groups of trees found infested with scale it is probable that at one time a flock of birds had chosen those trees to light upon and in so doing had caused the scale to spread over a greater area.

The San Jose Scale was found on apple, pear, peach and plum as well as on various ornamentals such as Thorns and Mountain Ashes. A difference of immunity of course exists in the various varieties of nursery stock, but no notes were taken in this regard. It was noticed, however, that the Bartlett pear, the Ben Davis apple and the Japanese and Damson plums were the most susceptible of the various classes of stock they represent.

Block of one-year apple stock in the nursery of Morris and Wellington, Foothill.

A red coloration of the underlying epidermis is usually indicative of the San Jose Scale, but often this red color is masked by the nature of the bark of some trees. In plums especially it is quite difficult to discern even by a close examination, and a hand microscope is then necessary for identification.

2. Pear Tree Slug, *Selandria Cerasi, Peck.*—This well known slimy dark brown slug was found to be very prevalent this year, and present in every nursery examined. The larva of the insect itself was either found or else the marks of its injury were in evidence. The larvae were reported on November 2nd. The leaves of the pear, quince, cherry and plum were all attacked. By skeletonizing the leaves and consequently by reducing the required amount of leaf surface the young trees lose a percentage of their vitality proportional to the extent of defoliation. The wintering pupal state is passed beneath ground.

3. Red Spider, *Tetranychus ap.*—This animal is probably of universal distribution in the nurseries. It is entirely leaf feeding, causing discoloration and the curling of the leaves. It is usually found in conjunction with the Leaf Hopper (Empoasca) to which the curling of the leaves is principally due. It was found on the under side of the leaves of plum, grape, apple, pear and various ornamentals.

4. Oyster-Shell Bark-Louse, *Mytilaspis pomorum.*—This insect has not been observed in every nursery nor has it appeared in alarming numbers where it has been found. Several trees were completely encrusted with it, but the sum total of these trees is yet an infinitesimal percentage of the number in the nurseries. It would appear to be more of an orchard than a nursery pest. It is parasitised rather freely by a small pale yellow chalcid fly (*Aphelinus Mytilaspis*). On August 20th this parasite was observed in considerable numbers.

5. Wooly Apple Aphis, *Schizonura lanigera,* Hausm.—Possibly next to the San José scale this insect is most to be feared. Especially is this true in climates that are warmer than our own, when the insect has greater opportunity to thrive and multiply. The identification of this insect in the nursery is made possible by the typical erection of a downy, cotton-like covering. When present, it is found in cracks and crevices of the bark, in pruning scars, and on the tender, young twigs. It derives its nourishment from the sap of the tree, and, when numerous, causes swelling and severe punctures in the bark and tender epidermis. Damage to the stock caused by this aphis above ground is probably secondary in nature. That is to say, by continual punctures the access of fungal and bacterial diseases is made possible. Death of a tree may, however, in severe instances result from the effects of this insect alone. Such a case was not observed. Winter is passed in the egg stage on the bark, and also possibly in the adult condition. Early in November of this year some of these insects were found on the roots of an apple affected with Crown Gall. According to reports of nurserymen, this insect in some years is very frequently found in and around the roots of apple. This year, they say, they have not often been noticed. The season thus far has been mild and temperate.

6. Apple Tree Aphis, *Aphis mali.*—The oval jet black eggs and the green adults of this species are sufficiently well known not to warrant description. It is well distributed in the nurseries, and according to report not as prevalent this year as some years previous. The injury caused is again principally secondary. It is supposed that fire blight gains access to a nursery tree through the medium of this insect.

7. Peach Tree Borer, *Sanninoidea exitiosa*, Say.—While this insect is one of the worst with which the peach grower has to contend, fortunately it has not been found in excessive numbers on peach trees growing in the nursery row. From the fact that it is present, however, it is worthy of attention. Peach orchards are often severely attacked, but it would appear that entrance to an orchard is more easily effected by the female moth itself rather than by transmis-

One-year sweet cherry stock, showing good type of tree to plant.

sion in nursery stock. In peach trees its presence is noted by the gummy exudation on the trunk at the surface of the ground.

8. Pear Tree Blister Mite, *Eriophyes pyri*, Pagnst.—The discoloration on the under side of pear leaves and the rough appearance of the same is caused by the above named insect. Beyond its devitalizing activities it is not dangerous, but nevertheless quite prevalent in nurseries.

9. Apple Leaf Hopper, *Empoasca mali*, LeB.—One of the most noticable and at the same time one of the most easily distributed of the nursery insects, it is found in every nursery, attacking apple, plum and various ornamentals. It causes a curling and shrivelling of the leaves and in consequence exerts a dwarf-

ing effect on the tree itself. Adults were noticed late in November of this year, usually around the trunks of the trees.

The following insects have been observed to be present in a lesser degree in the nurseries:—

10. Currant Stem Borer, *Aegeria tipuliformis,* Linn.
11. Apple Tree Tent Caterpillar, *Malacosoma Americana,* Fab.
12. Shot Hole Borer, *Scolytus rugulosus,* Ratz.
13. Putnam Scale, *Aspidiotus ancylus,* Putnam.
14. Forbes Scale, *Aspidiotus Forbesi,* Johnson.
15. Lecanium Scale, *Eulecanium cerasifex,* Fitch.
16. Cigar Case-Bearer, *Coleophora fletcherella, Fernald.*
17. Red Humped Apple Tree Caterpillar, *Oedemasia concinna,* Sm. & Abb.
18. Fall Webworm, *Hyphantria textor,* Harris.
19. Cecropian Moth Larva, *Samia cecropia,* Linn.
20. Plum Tree Sphinx Larva, *Sphinx drupiferarum,* Sm. & Abb.
21. Tussock Moth (Larva Eggs), *Orygia leucostigma,* Sm. & Abb.
22. Unicorn Prominent, *Caelodasys unicornis,* Sm. & Abb.
23. Apple Bucculatrix, *Bucculatrix pomifoliella,* Clemens.
24. Trumpet Leaf Miner, *Tischeria malifoliella,* Clem.
25. Cherry Aphis, *Mysus cerasi,* Linn.

Fungi.

1. Powdery Cherry Mildew, *Podosphaera oxyacantha,* DeBary.—Found on both surfaces of the leaves of the cherry. Some varieties of stock suffered worse than others. It is well distributed and very plentiful. We have, however, no basis for comparison. It appears that the chief injury resulting from this disease is its effects on the tender young leaves and unfolding buds—preventing maturity and hindering development. Its presence is noted by the thin coating of white threads spread over the surfaces of the leaves.

2. Black Rot of Grape, *Guignardia bidwellii.*—Prevalent, but possibly owing to the dry season this disease has not shown itself overabundant. Its presence is noted by the brown blotches on the leaves of young grape cuttings.

3. Pear Scab, *Fusicladium pirinum.*—May be mentioned as one of the diseases of fairly wide distribution. The dry season evidently controlled it.

4. Meliola Sp.—This fungus is saprophytic on the "honey dew" of plant lice. It is very common on the bark and leaves, especially in the fall. Probably no injury results beyond disfiguration. It is shown by the black powdery appearance on the bark.

5. Black Knot, *Plowrightia morbosa.*—Trees badly affected were, as a general rule, destroyed. For the reason that nursery stock only remains in the ground but for a limited time, this disease does not make much headway, in consequence of which at no time were many trees found affected in a single nursery. In advanced stages the fungus becomes so pronounced that there is not much possibility of spread to young orchards by transmission in nursery stock. The mycelial threads may, however, be dormant in the tissues and not observable.

6. Twig Mildew.—The whitish appearance of the tips of twigs has not been determined. It is either due to a form of Meliola or else it is separate mildew fungus.

Among other fungi noticed to a lesser degree may be mentioned:—

7. Gooseberry Mildew, *Microsphaera.*
8. Currant Leaf Spot, *Gleosporium ribis.*

9. Leaf Curl, *Exoascus deformans.*
10. Grape Mildew, *Plasmopara viticola.*
11. Rose Mildew, *Sphaerotheca pannosa.*
12. Nectria Fungus.—Found only on dead or dying trees.

A good type of 2-year sour cherry tree growing in the nursery of W. O. Burgess, Queenston.

Plant Diseases.

1. Fire Blight, *Bacillus amylovorus.*—This bacterial disease resulting probably from insect injury is common to most classes of nursery stock. It is quite prevalent, with the extent dependent on the class of stock. Severe cases will kill the trees in one season's growth and the diseased tree can be easily observed even when all leaves are gone. Slight cases, while easily noticed when trees are in leaf, might possibly be overlooked in shipping. Injury resulting to a tree after spraying with kerosene and water may be easily mistaken for the effects of the blight organism.

2. Crown Gall.—It is impossible to overestimate the importance of this disease with regard to the nurserymen. To the nurseryman, who in some cases may have to destroy two-thirds of his apple stock, it is a serious foe and one upon which we have as yet no reliable knowledge. Various theories are advanced and it is customary to accept these as fact, but as yet no definite cause has been assigned and until further authoritative study is given this subject we shall remain in doubt. Whether this Crown Gall is a disease or a physiological effect on the tree itself, the fact nevertheless remains that numerous trees are yearly discarded by the nurseryman merely from the fact that they are unsightly and unfit for sale.

During this summer this condition of root enlargement has been observed on apple, peach, plum, sweet and sour cherry, raspberry, mountain ash. According to diagnosis of a nurseryman, it is reported also on American ivy. The extent and prevalence of this unsatisfactory condition of stock appears to be dependent on variety and soil. Some varieties show greater inclination to produce Crown Gall and some soils, chiefly the sandy soils, appear to contain more affected trees.

3. Black Heart.—Presumably winter and late spring injury resulting from frost. Too close trimming, it is said, will cause this undesirable condition of trees.

The Report of the Inspector of San Jose Scale. By R. H. Lewis, Hamilton.

In my capacity of Provincial Inspector of San Jose Scale I have examined the qualifications of three new local inspectors and have recommended the appointment of two of these applicants. The third applicant in my opinion did not present the proper qualifications and knowledge which would make an efficient inspector. I visited and inspected the work of the local inspectors in those municipalities that have availed themselves of the opportunity of appointing one, and after having ascertained as to the efficiency of their work and correctness of their accounts, I certified to them according to the Act. On some occasions I was called out by local inspectors in instances when the owner of an orchard refused to spray and observe proper treatment in order to control the scale. In some instances I was forced to have the orchards destroyed or sprayed immediately, and in every case my instructions were carried out.

The San Jose Scale has spread very rapidly this season owing to the favorable conditions and very dry weather. In southern Ontario where the scale is doing its greatest damage spraying is being carried on more extensively and thoroughly than in the past, especially in the vicinity of Leamington, and it would seem that more and continued instruction in the preparation and application of lime and sulphur would not only be beneficial but very much appreciated by the growers.

From my observation of the infestation of our nurseries I feel that the nurseryman should be protected as much as possible from any source of dangerous infection such as neglected fence lines and infested orchards. I would recommend that the owners of these orchards and fence lines be made to observe such conditions as will minimize the probabilities of infection.

The Distribution of San Jose Scale in Ontario.

It is now nearly sixteen years since the scale made its appearance in the United States, and thirteen years since its first appearance in Ontario.

The first specimens were received from near Chatham in January, 1897, and shortly afterwards scale was found in orchards near Niagara-on-the-Lake and St. Catharines. In 1900 it was reported to have been located at East London by Mr. J. Dearness, and Professor Lochead discovered it at Essex Centre.

In 1902 by an amendment of the San Jose Scale Act township councils on application of fifteen ratepayers were empowered to appoint inspectors subject to the approval of the Minister of Agriculture, the Department paying half the expenses. The townships of Saltfleet, North Grimsby and Clinton took advantage of this and as a result several infections of scale were discovered and the distribution was proved to be greater. From now on the scale area gradually increased.

In the Niagara District the distribution of the scale may be said to be general. It is found in every locality and also above the mountain wherever fruit growing is practised. In the Fonthill district nearly every apple orchard is infested. It is found around Burlington, but the infestations are light and not general. The scale has made inroads into some of the other counties. In 1907 it was found in Elgin, near St. Thomas, and in Peel County near Lorne Park, in 1908 in Oxford and Norfolk, near Tillsonburg, and in 1909 in Prince Edward County, near Picton and in the northern part of Ontario County near Zephyr. In all these cases the infected areas were promptly inspected and proper precaution taken to prevent its spread.

In western and south-western Ontario the scale seems to be spreading. It has taken a firm hold near Tillsonburg in the Township of Middleton, Oxford County. In the report of the township inspector we find there were twelve cases of infestation. Half of these were bad and three very bad. The scale may have a wider distribution in western Ontario than intimated in this report as a good deal of the territory is admirably adapted to its best development, but as the Department is largely dependent upon accidental discoveries where no local inspectors exist a more accurate description of its limitations is not possible.

The scale may be said to be doing most damage in the Counties of Essex and Kent. Here but few of the orchard owners are spraying and giving their trees proper attention and it is getting a stronger hold from year to year. A great many orchards have already been taken out. The same conditions exist in the Fonthill district, where the scale is thoroughly disseminated and is doing a lot of damage to the apple orchards. Little, if any, attention is paid to it in such orchards, but on the other hand those farmers that raise any of the tender fruits spray, and as a result have the scale well in check.

In the Niagara district the scale is no longer looked upon as a great obstacle, for spraying with the lime sulphur solution is almost universal. From Hamilton to Jordan it may be found almost everywhere, but it never got a very strong hold in any township except perhaps in one or two isolated orchards. In the Township of Grantham the scale secured a good footing before the farmers fully appreciated what could be done in controlling it by a little attention and thoroughness. However, within the last few years spraying has been carried on by every fruit grower with the result that there is practically no scaly fruit now shipped from the township.

In Niagara Township the scale has done considerable damage. It has wiped out nearly every apple orchard in the neighborhood of Niagara-on-the-Lake. Nearly all the old fruit trees, both apple and peach, in that section have been destroyed and their owners must have had heavy losses. Within the last few years a great many new orchards have been put out, and to-day Niagara Township has the

largest and best peach orchards in the district with practically no trouble from Scale. A few remaining apple orchards still constitute a serious menace to the new orchards and should be cleaned out without delay.

One of the important factors in the control of the scale which has not yet received proper attention is the method or lack of method adopted by the cities, towns and villages in which there are hundreds of trees badly infested, and back yards in which one may find fruit trees encrusted with scales. It would seem that the authorities in charge should adopt some thorough inspection and treatment of infested trees.

The number of municipalities which have appointed inspectors under the provisions of the San Jose Scale Act is slowly increasing. This year the Fruit Branch adopted a system of supplying the inspectors with blank report books

A fine apple orchard in N'agara Township dying from attack of the San Jose Scale.

consisting of duplicate sheets, one of which is returned to the Department and the other kept by the municipality. By this method the Department is able to keep a record of the spread of the scale in townships having inspectors and of the work done by such inspectors.

The following is a list of municipalities and inspectors:—

Township.	County.	Inspector.
Barton	Wentworth	Harry F. Burkholder.
Saltfleet	Wentworth	Walter E. Biggar and J. P. VanWagner.
N. Grimsby	Lincoln	H. L. Walker, Wm. A. Coon and E. J. Biggar.
C inton	Lincoln	John Read and Chas. Watson.
Pelham	Welland	Harry Arnold.
Mersea	Essex	J. R. Johnson.
Pelee Island	Essex	Wm. Stewart.
Middleton	Norfolk	J. C. Herron.
Thorold	Welland	Albert Nelson.
Niagara	Lincoln	Fred. Sheppard.
St. Catharines	Lincoln	Wm. Elliott.
Thorold	Welland	Sam. Martin.
Leamington	Essex	J. R. Johnson.
Walkerville	Essex	J. B. Forest.

Spread of the Scale in Ontario.

This year the San Jose Scale was reported from two points which had hitherto been free from this pest. In August, Dr. Hewitt, Dominion Entomologist, advised the Department that a specimen of scale submitted by Mr. Thomas J. Murray, Zephyr, Ontario, was identified as the San Jose Scale. On inspection the scale was found on one Japanese plum tree, which was very badly infested. This tree was planted in the spring of 1908 and the insect had, therefore, passed through one winter in a section where it was supposed it could not live.

The farm is located in the township of Scott in the County of Ontario and near Lake Simcoe. The orchard in which the scale appeared consisted of some young trees two years planted and a few older apple and peach and was in an isolated position with regard to other orchards. The infested tree has in this case been destroyed and the remaining trees will be sprayed with lime and sulphur in the spring. This tree was undoubtedly scaly when sent out by the nurseryman. Fortunately the nursery from which it originated was inspected by order of the Minister of Agriculture in the spring of 1908 and all the stock destroyed.

The second apearance of the scale was in Prince Edward County, one of our best apple producing sections. Mr. F. M. Powers, a farmer living east of Picton, noticed the unusual appearance of some of his young trees planted in 1908 and notified Mr. A. P. MacVannel, the District Representative of the Department of Agriculture, who examined them and found the cause to be the San Jose Scale. Samples were sent to the Entomologist of the Agricultural College, Guelph, who confirmed Mr. MacVannel's identification. The Fruit Branch being notified of the infestation detailed one of its inspectors to make a thorough investigation of the condition of the infected orchard and others in the neighborhood purchased through the same agent. Mr. Treherne reports that Mr. Powers had purchased 625 trees consisting of the following varieties: Ben Davis, Pewaukee, Gano, Delaware, Tolman and McIntosh, which were planted in the spring of 1908. It was not until September 1st, 1909, that the owner noticed the appearance of the infected trees. The variety on which the scale was found was the Ben Davis. Five trees in all were attacked, one of which had only a slight infestation. It would appear from the condition of the scale on the infested trees that the San Jose Scale will live in this section although its increase would be much less, owing to the severe winters, than in the southern parts of the Province.

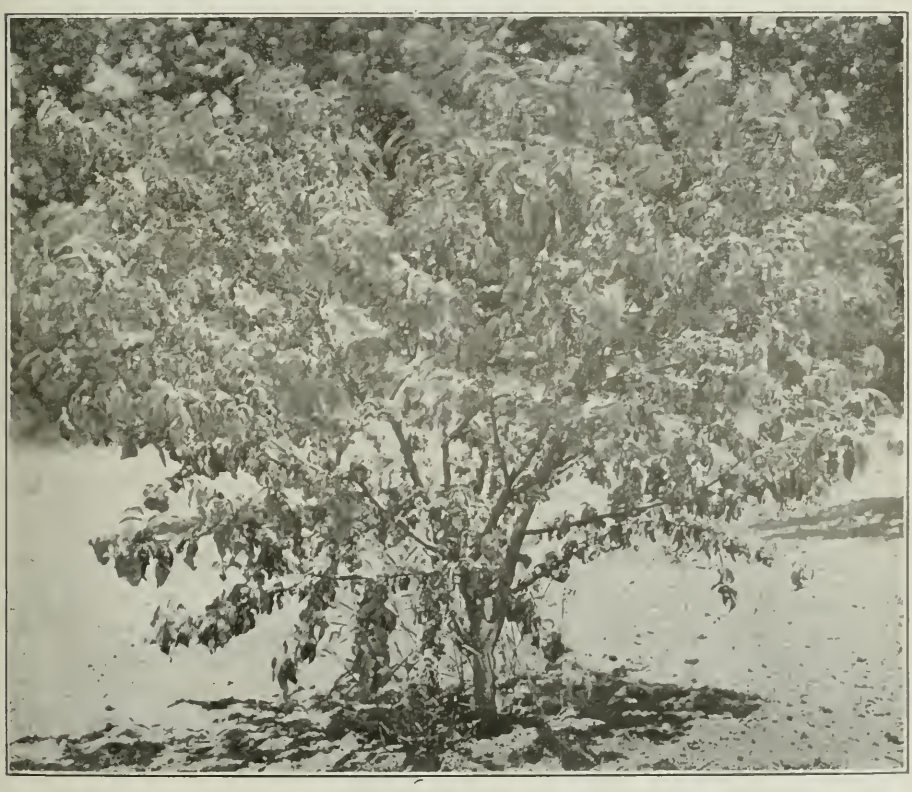
Mr. Treherne visited the farm of Mr. Tom Wright, who had also purchased stock in 1908 from the same source as Mr. Powers. One tree was found to be slightly infested with the scale and was destroyed. Ten other farms on which stock from the same nursery was planted, were visited and inspected and the trees were found to be free from any trace of scale. In both these cases of San Jose Scale in new sections in the Province the infection has been conclusively traced to nursery stock. The percentage of infested trees has been small, but nevertheless these few trees would have in all probability introduced this terrible pest into one of our best apple growing sections. These instances prove that an annual inspection of nurseries, control of infested orchards in the vicinity of nurseries and the fumigation of all stock must be rigorously enforced.

In conjunction with the above inspection in Eastern Ontario the Department has obtained a list of local agents who distributed stock from the same source,

Elberta peach treesprayed with lime-sulphur. Note heavy crop of large fruit and absence of leaf-curl.

Four-year-old peach tree sprayed with home-boiled lime-sulphur. Note healthy foliage and absence of leaf-curl.

Leaf curl overcome by spraying with home-boiled lime-sulphur wash on farm of F. Blaikie, St. Catharines.



Four-year-old peach tree, unsprayed, showing effects of leaf-curl on the foliage.

and all young orchards planted therefrom are being inspected. This is slow and expensive work and should not be necessary if all of the nurseries will co-operate with the Department in carrying out the regulations.

Lime Sulphur as a Fungicide.

The use of the lime sulphur mixture for the destruction of the San Jose and Oyster Shell scales, as already shown, has increased enormously in all districts during the past year. The fact that this mixture is also very useful as a fungicide has perhaps had a great deal to do with its popularity. In the

Elberta peach tree unsprayed, showing defoliation and loss of fruit from leaf curl.

peach districts where applied early in the season leaf curl was practically controlled and a good set of fruit was obtained. In unsprayed orchards the disease was so bad the past season that the first crop of leaves, together with the young peaches, was almost entirely lost.

Some growers reported that the lime sulphur did not control the leaf curl, but it was found on investigation that this was due entirely to too late an application. The men had put off the spraying until the buds were opening, with the result that the fungus had already secured a foothold in the tissues of the leaves. The illustrations given herewith show very clearly the difference between the sprayed and unsprayed trees. On the farm of Mr. George A. Robertson, St. Catharines, two old Elberta trees stood off by themselves from the balance of the orchard. One was sprayed and the other was left untouched, with the result as shown in the photos. The crop of fruit on the sprayed tree was enormous, while practically nothing was obtained from the other.

The other illustrations were taken in the orchard of Mr. Frank Blaikie of Port Dalhousie. Mr. Blaikie's orchard was sprayed with the exception of five trees in one corner of the orchard where the men ran short of material. These trees despite the fact that they were in the pink of condition, were practically defoliated, while the balance of all of Mr. Blaikie's orchards was almost entirely free from the leaf curl.

Fruit and foliage from sprayed Elberta peach tree on farm of Geo. A. Robertson, St. Catharines

Report of Experiments Carried on in Essex County. By A. McKenney, of the Department of Agriculture.

Our Spraying Demonstration work in Essex County has been confined chiefly to testing the efficiency of home boiled lime sulphur and different com-

mercial sprays for controlling the San Jose Scale. The following is a brief outline of the work done.

Nine trees badly infested with scale were sprayed in April, 1908, with home boiled lime sulphur, 20 lbs. lime, 18 lbs. sulphur, and 40 gallons of water with good results, and again in April, 1909. Some of the trees are absolutely free from scale now, while those that have any are only slightly infested.

Nine trees previously sprayed in April, 1908, with V 1, and still badly infested with scale, were sprayed in November, 1908, with home boiled lime sulphur. None of these trees were sprayed in the spring of 1909. Only a portion of the scale was killed, but these are not nearly as badly infested as the check tree.

Eighteen trees previously sprayed with V 1 in April, 1908, without giving any results whatever, were again sprayed with V 1 in April, 1909, with absolutely no effect on the scale. The solution was carefully applied and mixed according to the instructions, 1 to 100.

Eighteen trees badly infested with scale were sprayed in April, 1908, with Niagara Brand lime sulphur, 1 to 10, with pretty good results, and again in April, 1909, with Niagara Brand 1 to 10. There is still a little scale on the trees, the work not being quite so marked as where the home boiled was used.

Nine trees badly infested with scale were sprayed with Grasselli lime sulphur 1 to 10. A large portion of the scale has been killed, but the trees are still slightly infested.

Nine trees badly infested were sprayed with Grasselli Brand 1 to 7, giving better results than where it was used 1 to 10, as nearly all the scale was cleaned out.

Conclusion.—Home boiled lime sulphur, 20 of lime, 18 of sulphur, and 40 gallons of water boiled for one hour will control the San Jose Scale. The Niagara and Grasselli brands if sprayed according to the directions are not quite strong enough to do the work as well as the home boiled, but if used about 1 to 7 they will kill the scale. Fall spraying is not as effective as spring spraying.

REPORT OF FUMIGATION.

The work of inspection of fumigation appliances was carried on as usual. The condition of the houses was not so good as the previous year, no doubt due to the wet spring. However, all were repaired and made air tight before being used. This year duplicate reports were made of the condition of these houses. One of these reports was retained by the inspector and the other given to the nurseryman. In both the repairs necessary before the buildings could be used for fumigation are specially mentioned, and the nurseryman must make such repairs before the return of the inspector.

This year the following local inspectors superintended the fumigation: A. E. Jones, district from Stoney Creek to Hamilton; R. W. Bartmann, St. Catharines and Queenston; Harry Arnold, Fonthill district.

The system of having local inspectors on the ground to see that all stock is fumigated is an excellent one and has worked very well. It has been found, however, that one man cannot efficiently superintend the fumigation in the Fonthill district, and an additional man will have to be appointed this spring.

The following is a list of nurserymen and seedsmen in Ontario:—

NURSERYMEN:

Morris & Wellington	Fonthill	General stock of fruit & ornamentals.
Brown Bros.	Brown's Nurseries	General stock, etc.
B. W. Secord	Pelham Corners	General stock, etc.
Jas. Page	Ridgeville	Fruits.
J. E. Crow	Ridgeville	Fruits.
A. G. Hull & Sons	St. Catharines	General stock.
J. E. McCombs	Pelham Corners	Fruits.
H. Cawker	St. Catharines	Roses.
C. E. Secord	St. Catharines	Peaches.
E. Morden	Niagara Falls	General stock.
W. B. Bridgeman	Queenston	Peaches and cherries.
Frank Walker	Virgil	Peaches.
E. D. Smith	Winona	General stock of fruit & ornamentals.
C. W. F. Carpenter	Winona	General stock of fruit & ornamentals.
J. W. Smith	Winona	Peaches.
W. B. Bridgman	Winona	Peaches.
J. E. Henry	Winona	Peaches.
J. E. Foran	Winona	Peaches.
G. M. Hill	Fruitland	General.
Jos. Tweddle	Fruitland	Small Fruits.
Brock Galbraith	Bartonville	Peaches.
Connon Floral Co.	Hamilton	Ornamentals.
C. E. Woolverton	Grimsby	Ornamentals.
W. H. Bunting	St. Catharines	Strawberries.
H. P. Van Wagner	Stony Creek	Dahlias and gladioli.
Thos. Rowley	Leamington	Peaches and grapes.
Frank McLean	Brigden	Fruits.
N. E. Mallory	Blenheim	Small fruits.
McDowell Bros.	Tillsonburg	Small fruits.
John Downham	Strathroy	Strawberries.
J. Gammage & Sons	London	Ornamentals.
C. A. Baker	London	General.
R. C. Chrysler	St. George	Strawberries.
W. H. Vanderburg	Poplar Hill	Strawberries.
M. Milgau	Bright	Evergreens.
Hunter & Sons	Scotland	Fruits and dahlias.
J. McAinsh	Wellburn	Evergreens.
Mitchell Nursery Co.	Mitchell	Evergreens.
Campbell Bros.	Simcoe	Cannas, dahlias, gladioli, paeonies.
Jas. E. Johnson	Simcoe	Strawberries.
Wm. Fleming	Owen Sound	Small fruits.
J. H. Wismer	Port Elgin	Fruits.
Estate John Stewart	Ben Miller	Fruits.
J. W. Johnston	Campbellford	General.
L. K. Shourds	Wellington	Apples.
W. C. Reid	Belleville	Ornamentals.
McIntosh & Smith	Mountain	Fruits.
J. W. Thompson	Napanee	Strawberries.
Ottawa Nursery Co.	Ottawa	General.
David Tait	Iron Bridge, Algoma	Hardy fruits.
R. Breckon	Toronto	Small fruits and ornamentals.
Colin McDonald	Toronto	Small fruits and ornamentals.
Thos. Manton	Eglinton	Ornamentals.

SEEDSMEN:

Steele Briggs Seed Co.	Toronto & Hamilton.
J. A. Simmers	Toronto.
Wm. Rennie Co.	Toronto.
John A. Bruce & Co.	Hamilton.

ORCHARD SURVEYS.

During the summer of 1909 this Branch, in conjunction with J. W. Crow, Professor of Pomology at the Agricultural College, carried out a survey of a number of districts in the Province to ascertain the status of the fruit industry therein. The Department of Agriculture had in previous years done more or less of this work for special crops throughout the entire Province and reports of such work have been published to cover such crops as tomatoes, beans, potatoes and tobacco.

The surveys of 1909 were limited to certain well defined districts with the idea of getting definite figures as to the orchard crops within these districts. The men in charge of this work were instructed to visit every farm where fruit was grown and give a detailed report thereon in respect to the following points: Size of orchard, site, planting plan, aspect, varieties of fruit, with the number of trees, their age and distance apart, type and depth of soil, sub-soil, drainage, tillage, cover crops, fertilizers, pruning, spraying, insect and fungous diseases, yields of fruit, where and how sold with prices, where possible, for a number of years.

The information obtained has been compiled and will be published as an appendix to this report under a separate cover. Fruit growers in any locality in the Province would do well to secure the report and to study carefully the results shown there from a large number of orchards in different parts of the Province.

The sections reported on and the men carrying out the work are as follows:

Lake Huron district, including parts of the Counties of Lambton, Huron, Middlesex, Perth and Bruce, in charge of Messrs. T. B. Faulds and S. E. Todd.

Kent County, in charge of Mr. Norman Foster.

Simcoe County, in charge of Mr. A. D. McIntosh.

The Townships of Barton, Saltfleet and North Grimsby, in the County of Wentworth, in charge of Mr. W. D. Jackson.

In addition there will be published in the same report a special survey made of the Township of Murray, in Northumberland County, by Mr. T. B. Revett of this Branch, and also a soil survey made of the entire Niagara District by Mr. H. H. LeDrew.

INSTRUCTION IN PACKING.

This work was continued along similar lines to 1908. One expert only could be engaged, owing to lack of funds. This man spent his whole time in September, October, and November visiting the packing houses and orchards of co-operative associations throughout the Province examining the work of the packers and giving them instruction in the proper grading and barreling of their fruit. This work might well be extended to all of the orchards and packing houses of the Province, as it would seem that there was still a great deal of room for improvement in the proper packing of our apples especially. The federal inspectors under the Inspection and Sales Act report that the basket packing is now in excellent shape. The presence of a special inspector for the past few seasons in the Niagara District has resulted in a decided improvement in the condition of the fruit in this kind of package.

The past season serious complaints were made as to the packing of apples both in barrels and boxes. This was perhaps mainly due to the increased activity on the part of the federal inspectors. At the same time we have reason to believe that there are still enough dishonest or ignorant packers in the country to seriously injure the reputation of our Ontario fruit. An extension of the instruction in the packing of this fruit should go a long way towards eliminating the excuse of ignorance.

LEGISLATION.

A year ago a special Committee of the Fruit Growers' Association of Ontario drafted a bill covering the inspection of orchards and spraying of trees for insect pests. This bill was based on the San Jose Scale Act, which had proved of great value in checking the ravages of that insect. On the advice of the Minister of Agriculture the Committee appeared before the Agricultural Committee of the House and explained in detail what was aimed at in the proposed legislation. Owing to the lateness of the session the matter was left over until the next session of the legislature with the advice from the Committee to submit the bill to provincial and local fruit growers' associations for criticism. This was followed out, and after some changes had been made the bill was introduced into the legislature as a government measure and was adopted with one change. The disease known as Crown Gall or Root Gall was suggested to be included within the provisions of the law. It was found, however, on consultation that the best authorities on the continent thought as yet not enough was known concerning this disease to place it in the same class as peach yellows, black knot, etc.

It will be noted in the clauses of the Act, which is printed in full herewith, that the matter of enforcement rests largely with the fruit growers themselves, as was the case with the San Jose Scale Act. On a properly signed petition being presented to the council of any municipality such municipality must enforce the Act. Spraying may thus be made compulsory in any section provided there is enough public opinion behind such action to see that the proper inspection takes place and that the other provisions of the law are enforced.

AN ACT TO PREVENT THE SPREAD OF INSECT AND FUNGOUS DISEASES INJURIOUS TO VEGETATION.

His Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:

1. This Act may be cited as *The Fruit Pests Act.*

2. In this Act

"Minister" shall mean the Minister of Agriculture for the Province of Ontario.

"Plant" shall mean any tree, vine, shrub or plant.

"Disease" shall mean the following insects and diseases in any stage of development: Codling Moth, San Jose Scale, Yellows, Little Peach, Black Knot, Pear Psylla and Pear Blight.

3. On the recommendation of the Minister, the Lieutenant-Governor in Council may appoint one or more competent persons to act as inspectors, whose duties shall be to enforce the provisions of this Act.

4. No person shall import or bring, or cause to be imported or brought into the Province of Ontario, for any purpose whatsoever, any diseased plant or fruit.

5. No person shall keep or have, or offer for exchange or sale, any diseased plant.

(*a*) All persons owning, leasing or managing any orchard or collection of plants, other than a nursery, shall, when any plant therein becomes diseased and forthwith on becoming aware, whether by notice or otherwise, of such disease, destroy such plant by fire or shall effectually treat the disease by fumigation or spraying with such material as may be prescribed by the Minister.

(*b*) The council of any city, town, township or incorporated village may, and upon the petition of twenty-five or more fruit growers who are ratepayers, shall by by-law appoint at least one inspector to enforce the provisions of this Act in the municipality and fix the amount of remuneration, fees or charges he shall receive for the performance of his duties. All such appointments, as well as such remuneration, fees or charges shall be subject to, and be only operative on, the written approval of the Minister, communicated by him to the clerk of the municipality. The by-law shall not take effect unless and until approved by the Minister of Agriculture, and shall remain in force only for the calendar year in which it is passed. The clerk of the municipality shall transmit a certified copy of every such by-law to the Minister of Agriculture before the first day of May after the passing thereof.

(*c*) Upon the report of the inspector to the reeve or mayor that there is disease upon the plants on any lot within the municipality, the reeve or mayor shall direct the clerk to give notice personally by the inspector or by registered letter to the owner or occupant of the lot to have the plants forthwith sprayed, and in case the same are not sprayed within ten days, the inspector may cause the spraying to be done and the cost of the same shall be charged on the lot and be collected as a special tax in addition to the other taxes imposed by the municipal council on the lot.

(*d*) All such inspectors appointed shall be subject to and observe the regulations and directions of the Minister, and shall be subject and subordinate to the inspector appointed by the Minister, and in case of any neglect of duty such inspector shall be subject to the penalties prescribed by this Act.

(*e*) The council of the city, town, township or incorporated village shall pay the remuneration, fees or charges of such inspectors and shall be entitled to receive from the Department of Agriculture one-half of the amount so paid upon furnishing the Department with statements of the sums so paid, certified to by the inspector appointed by the Minister, provided that such statements are submitted to the Minister on or before the fifteenth day of December of the year to which they apply.

6. The owner or proprietor of any nursery shall not send out or permit any plant to be removed from his nursery without the same being first fumigated by hydrocyanic acid gas in accordance with regulations prescribed by Order of the Lieutenant-Governor in Council.

7. No person shall sell or dispose of or offer for sale any plant obtained, taken or sent out from a nursery unless the said plant has been previously fumigated by hydrocyanic acid gas in accordance with the above regulations.

8. In case the inspector finds disease in any nursery, and so reports to the Minister, the Minister may thereupon inform in writing the owner or proprietor or manager of said nursery of the existence of disease in his nursery, and the owner or proprietor or manager of said nursery shall not thereafter permit any plant or plants to be removed from the said nursery until he is notified in writing from the Minister that the inspector has reported to the Minister that it is safe in the public interest to permit the said nursery stock to be removed after fumigation.

9. For the purpose of scientific investigation the Minister may from time to time, by writing given under his hand, except such persons as he may deem proper from the operation of the two preceding sections, and while acting under such permission such persons shall not be subject to the penalties imposed by this Act.

10. Any person having reason to suspect that any plant in his possession or in his charge or keeping is diseased shall forthwith communicate with the Minister in regard to the same, and shall furnish the Minister with all such information in regard to the source or origin of the said infestation and nature of the same as he may be able to give.

11.—(*a*) Whenever disease exists or is supposed to exist on any plant, the Minister may direct a competent person to make an examination and inspection, and may order that any plant so infested, or such part as he may deem advisable, shall be immediately destroyed by burning, either by the person appointed to make the inspection or by the person owning or having possession of the said plant, or some other person so directed in writing, and the person so directed shall make a full report to the Minister in writing as to the nature and extent of the work so performed, together with a fair estimate of the value of the plants destroyed.

(*b*) If, in the case of an orchard or collection of plants, the inspector finds disease on plants located in several different parts of the orchard or collection, and decides that it is advisable in the public interest to destroy all the plants in such orchard, or in any part or parts thereof, and so reports to the Minister, the Minister may direct that an examination or inspection shall be made by an additional inspector, and upon their advice in writing he may direct that all the plants in such orchard or such collection of plants or in such part or parts thereof shall be destroyed without requiring that every plant in the said orchard or collections shall be first examined.

12. Any person appointed under section 3 of this Act to inspect or destroy any plant for the purpose of enforcing the provisions of the Act, and any inspector appointed by the council of any municipality, shall, upon producing his authority in writing, have free access to any nursery, orchard, store-room or other place where it is known or suspected that any plant is kept.

13. Any person neglecting to carry out the provisions of this Act, or any person offering any hindrance to the carrying out of this Act, shall upon summary conviction be liable to a fine of not less than twenty dollars nor more than one hundred dollars, together with costs, and in default of payment thereof shall be subject to imprisonment in the common gaol for a period of not less than ten days nor more than thirty days.

14. The Lieutenant-Governor in Council may, by Order, direct that other diseases than those mentioned may be included in the provisions of this Act, and thereafter during the continuance of such Order-in-Council the word "disease" in this Act shall include all such other diseases. Public notice of such Order-in-Council shall be given by publication in two successive issue of "The Ontario Gazette."

15. The Acts known as *The Yellows and Black Knot Act*, *The Noxious Insects Act*, and *The San Jose Scale Act* are hereby repealed.

CO-OPERATIVE ASSOCIATIONS.

Continued activity was displayed in co-operative work among the fruit growers. A number of new associations were organized, while some of those that had proved a failure in the past were re-organized. The shipping season proved to be fairly successful for those associations that sold their crop early. A number who continued to consign to firms in the Old Country received poor returns for the early part of the season when the bulk of their crop went forward. These associations had been receiving considerably higher prices, however, during the previous two seasons and will probably feel that taking the past three years into consideration they will have received about as much for their apples as the associations following the other plan of selling direct.

The continued success of the Norfolk Fruit Growers' Association is undoubtedly due to the energetic action of the manager, Mr. James E. Johnson, and the other officers of this Association in consistently holding up the quality

of their fruit above the government standards and adopting up-to-date advertising methods for their goods. The following returns were made by this Association to their members for the last year's crop:—

Class 1, $3.30.

No. 1's Spy.
King.
Spitzenburg.
Snow.
King Pippin.
German King.
Hyslop Crab.
McIntosh Red.

Class 2, $3.00.

No. 1's Baldwin.
Russet.
Blenheim.
Canada Red.
Newtown.
Cranberry.
No. 1's Greening.
Ribston.
Hubbardson.
Wagner.

Class 3, $2.65.

No. 1 Odd Varieties.
Fall Varieties.
No. 2 Hail pecked.

Class 4, $2.35.

No. 2 Varieties of classes 1 and 2.

Class 5, $2.00.

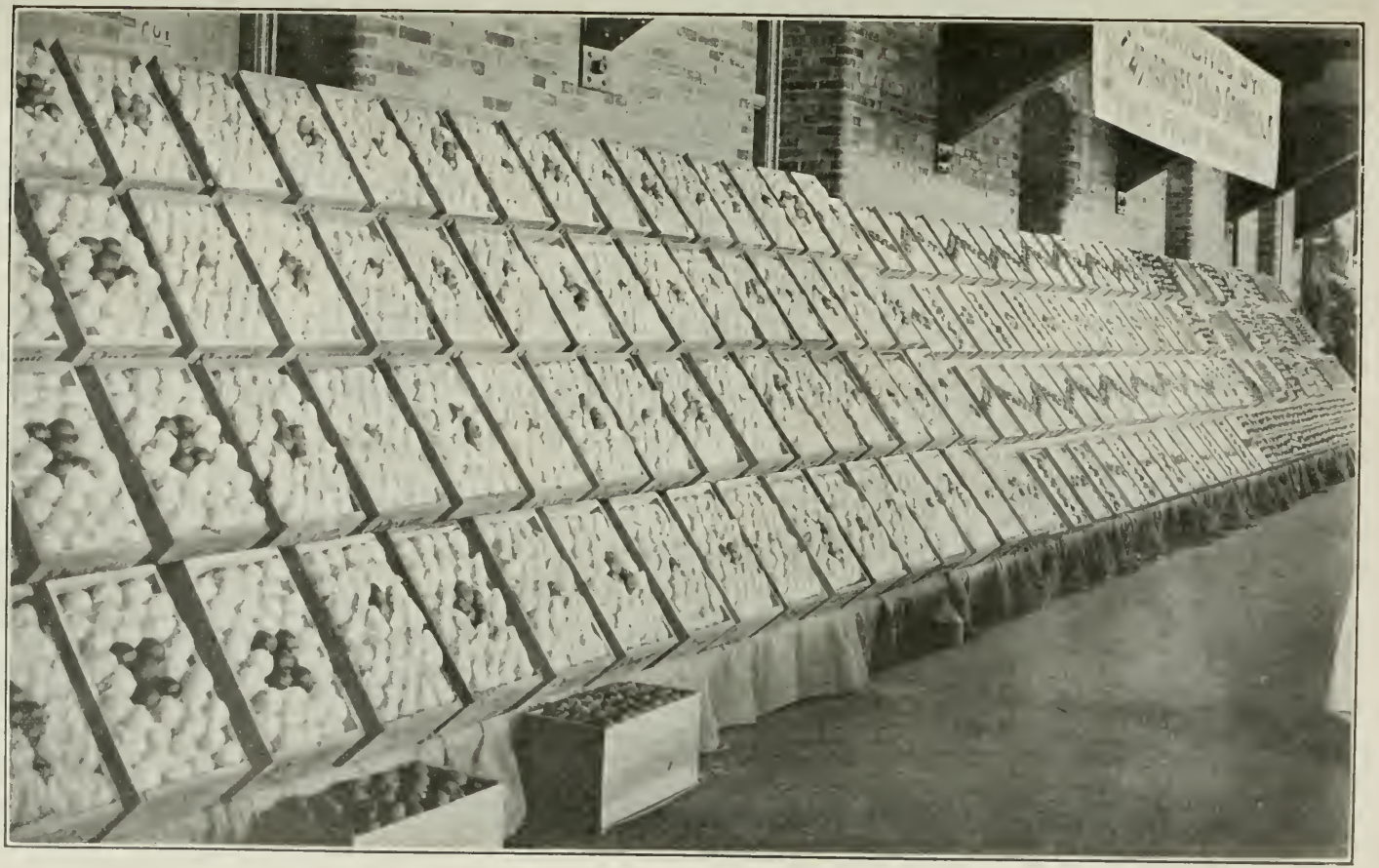
No. 2 Odd Varieties.

CO-OPERATIVE FRUIT GROWERS' ASSOCIATIONS.

Arkona Fruit Growers' Association	T. A. Lampman, Arkona.
Belleville Apple Growers' Association	F. S. Wallbridge, Belleville.
Brant Packing Association	F. M. Lewis, Burford.
Chatham Fruit Growers' Association	W. D. A. Ross, Chatham.
Georgetown Co-operative Association	F. J. Barber, Georgetown.
Georgian Bay Fruit Growers, Ltd.	G. H. Mitchell, Thornbury.
Gore Fruit Growers' Association	B. J. Palmer, New Durham.
Ingersoll Fruit Growers' Association	J. C. Harris, Ingersoll.
Newcastle Fruit Growers, Ltd., and Forwarding Association	W. H. Gibson, Newcastle.
Norfolk Fruit Growers' Association	Jas. E. Johnson, Simcoe.
Oakville Fruit Growers, Ltd.	T. Garner, Palermo.
Oshawa Fruit Growers' Association	Elmer Lick, Oshawa.
Owen Sound Fruit Company, Ltd.	Adam Brown, Owen Sound.
Sparta Fruit Growers' Association	J. A. Webster, Sparta.
Watford Fruit Growers' Association	D. G. Parker, Watford.
Grafton Fruit Growers' Association	J. G. Wait, Wicklow.
Alvinston Fruit Growers' Association	E. F. Augustine, Aughrim.
Arran and Amabel Fruit Growers' Association	J. Davidson, Skipness.
Arkwright Fruit Growers' Association	A. Gammie, Burgoyne.
Burgessville Fruit Growers' & Forwarding Co.	W. H. Kneal, Burgessville.
Burlington Fruit Growers' Association	W. F. W. Fisher, Burlington.
Canadian Apple Exporters, Ltd.	Frank Mallory, Frankford.
Clarkson Fruit Growers' Association	W. G. Horne, Clarkson.
Cobourg Fruit Growers' Association	S. W. Staples, Baltimore.
Dunnville Fruit Growers' Association	Chas. H. Weaver, Dunnville.
Hatchley Station Fruit Growers' Association	W. F. Robinson, Hatchley Station.
Ilderton Fruit Growers' Association	E. T. Caverhill, Ivan.
Mount Nemo Fruit Growers' Association	R. M. Spence, Nelson.
Orona Fruit Growers' Association	E. J. Hamm, Orona.
Paisley Fruit Growers' Association	Wallace Megraw, Paisley.
Forest Fruit Growers' Association & Forwarding Co.	D. Johnson, Forest.
Jordan Co-operative Association	J. A. Wills, Jordan.
St. Catharines Cold Storage & Forwarding Co.	Robt. Thompson, St. Catharines.
Grimsby Fruit Growers' Association	H. L. Roberts, Grimsby.
Winona Fruit Growers' Association	E. J. Henry, Winona.
Ontario & Western Co-operative Fruit Growers' Co.	C. J. McCollum, Grimsby.

MODEL BY-LAWS.

The following set of by-laws will serve as a guide to Associations who are organizing for educational purposes largely. The Clarkson Association, however, is also interested in the purchase of supplies.



Part of exhibit of boxed fruit put up by the St. Catharines Cold Storage and Forwarding Co., at the meeting of the American Pomological Society, 1909.

1. The organization shall be known as the Clarkson Fruit Growers' Association.

2. The annual membership fee shall be one dollar, and the same shall be payable on or before the second Saturday in January in each year. Any member failing to pay the fee shall cease to be a member, and can only rejoin the Association by paying two dollars. New members can be admitted at any time during the year by ballot on payment of a fee of one dollar. All memberships shall terminate on the thirty-first day of December in each year.

3. The officers of this Association shall be: President, first and second Vice-President, Secretary, Treasurer, and nine Directors, all of whom shall constitute the Board. They shall be elected annually, and continue to hold office until their successors are appointed. In case of urgency, when it would be impractical to call a general meeting of the members, the Board shall have power to act for the Association.

4. There shall be elected annually two Auditors to audit the accounts of the Association.

5. The annual meeting of the Association shall be held on the second Saturday in January, at such place and hour as the Board may decide.

6. At the annual meeting the election shall be by ballot, unless the majority of the members present decide to hold the same by open vote. No person shall be eligible for office or be entitled to vote who has not paid his fees in full for the current membership year.

7. At the annual meeting the Board for the past year shall present in writing a report of the proceedings of the year, including a statement of the financial condition of the Association. The financial statement shall first be audited and certified by the auditors.

8. The annual meeting shall be advertised by mailing to each member at least five days before the date thereof an announcement calling the members together; said announcement shall specify the date, place, and hour of meeting.

9. ORDER OF BUSINESS.

a. Reading and confirmation of minutes of previous meeting.
b. Communications.
c. Reports.
d. Election of officers, directors and auditors.
e. General business.

10. Ordinary meetings shall be held on the first Saturday in each month.

11. At all meetings of the Association ten members shall form a quorum. At meetings of the Board five shall form a quorum.

12. Any member who shall have been proved to the satisfaction of the Board guilty of any act liable to affect the credit, good standing, or in any way work against the interests or welfare of the Association, may, upon due notice, be dropped from the roll and barred from membership.

13. The constitution and by-laws may be amended at any regular meeting by a two-thirds vote of the members present, due notice having been given at previous meeting.

EXPERIMENTAL SHIPMENT OF PEACHES TO ENGLAND.

On the return of the Deputy Minister of Agriculture from England it was suggested to the Branch by the Minister of Agriculture that a small shipment of peaches be sent to the London office of the Department of Agriculture as an experiment. Thirty cases of Elbertas were selected on September 22nd, and packed as carefully as possible with the present peach case and the kind of packing material at hand. The fruit that was selected was fully developed and well colored. Color was given a preference to size and a medium sized peach was required, as it has been found by our experiments that the large fruits will not stand shipping as well as the medium sized, and that highly colored fruit carried much better than the less colored specimens.

The fruit was picked very carefully and taken from the orchard to the St. Catharines Cold Storage plant where it was slightly cooled. Each peach was then wrapped in tissue paper and packed as follows:

The box was layered at the bottom with about an inch of the finest grade of excelsior, upon which was placed a layer of cotton batting. The peaches were then placed one layer in a box. These were covered with cotton batting and a thick enough layer of excelsior was put in so as to make the box tight. Five boxes were then placed one on top of the other and crated together with two-inch strips at the sides and three-inch strips at the ends. This type of case made a good protection to the boxes and fruit and did not hinder ventilation.

Twenty-five boxes of peaches were packed and shipped by ordinary express to the Toronto Cold Storage warehouse. The shipment should have gone forward on the 23rd September, which was a day after the fruit had been packed, but owing to some mistake of the express company it had to be delayed until the week following, the peaches thus being in storage for ten days before they were started on the road. The express company, owing to the size of the consignment, could only provide cold storage on the ocean, the distance from Toronto to Quebec, and again from Liverpool to London, being covered in the ordinary express car in Canada and freight car in Great Britain.

The fruit arrived in London on October 12th, having been again delayed between Liverpool and London. Some of the peaches were displayed in the windows of the London office and samples were put on display at the Dominion Immigration office, the Grand Trunk and Canadian Pacific Railway offices. A case was also sent to each of the following stores in order to ascertain the value of the Ontario peaches on the London market: Army & Navy Stores, Fortnum & Mason, Picadilly; Whiteleys and Harrods & Company, Brompton Road. These firms reported at length upon the condition and quality of the fruit.

It appears from some reports that there is a doubt if a profitable market for the Ontario peach will be established in England. Others, again, think there is a good market to be opened for this fruit, but they emphasize the need of special attention to packing and lay much stress on the probability that very high prices need not always be expected.

With regard to this shipment of peaches there are one or two important points that must be taken into consideration. The fruit was delayed from a week to ten days from the time of picking before they were started on their journey, and it was a marvel that they arrived in fair to good condition. The shipment was decided upon at short notice, and no special information could be obtained as to the best packages and material for packing. In future shipments the boxes should not be more than from 3¾ inches to 4 inches deep, and the very finest grade of Aspin wool should be used to replace entirely the cotton batting which evidently heated the fruit. The London office has submitted a sample of excelsior used in France for packing fruit and known to the trade as aspin wool. This is an exceedingly fine grade of excelsior, which is bleached to a beautiful white color and adds considerably to the appearance of the package as well as offering the softest of material for packing.

Two shipments were made by private parties during the season, one of which, as reported by Mr. Fleming, of Grimsby, was a complete failure. The other was more successful, and, with the results of the Department shipment, give the growers some hope of ultimately opening up a new market for the product of our rapidly increasing peach orchards. The fact that Cape Colony, South Africa, is placing regular supplies of peaches, plums and apricots upon the London market should also encourage the Ontario grower, as the distance these fruits are shipped is greater than we have to contend with.

It is the intention of this Branch to experiment further this season, and the co-operation of the growers of the Niagara Peninsula will be asked for. Somewhat larger shipments will be sent forward at regular intervals, and, with improved packing and transportation, should determine the value of this market.

REPORT OF HORTICULTURAL EXPERIMENT STATION, JORDAN HARBOR.

By H. S. Peart, Director.

In preparing this, my second annual report on the work at the Horticultural Experiment Station, I shall endeavor to give a concise review of the work which has been inaugurated.

The season of 1909 has been one with many peculiar meteorological conditions. It was generally very unfavorable to plant growth and development. After a comparatively mild winter, the spring was cold and backward. On the well-drained land at the Station we commenced work on April 15th, but on the 16th heavy rain came, and until the 20th we had rain nearly every day, coupled with cold and dull weather. As a result of the cold wet weather our seeding proper did not commence until the 4th of May, which is very late for our locality. To make conditions even worse, the weather throughout the first part of May was dull and cold.

The following statement of the rainfall for each month during the growing season may be interesting:

	1909.	1908.
April	2.03 inches	1.66 inches
May	3 68 "	2.71 "
June	1.88 "	2.77 "
July	2.67 "	4.61 "
August	1.79 "	2.27 "
September	2.35 "	62 "

Just here a little explanation may be needed, else one may not see how these amounts of precipitation affected the growth of plants. After the wet weather in April and May, a severe drouth set in, and the first part of June was very dry, and the ground, after so much wet weather, seemed to bake very hard. The next drouth was in the first two weeks in July, when we had very warm and very dry weather, with the result that strawberries and the crops requiring a maximum of moisture at that season were reduced in yield from one-half to two-thirds of a normal crop.

The tile drainage put in in the summer of 1907 gave us very marked results in increased production of plant growth and in the reduced labor required to fit the ground for the reception of crops. On the sandy land and on the clay loam the results were most marked, while on the heavy clay the full benefits have not yet been apparent, as the nature of the soil prevents the water from reaching the drains readily, yet on these same lands the crops were planted and had made good progress before an adjacent field of the same soil was fit to be ploughed.

Fruits.

The following list of fruits was added to our plantation during the spring:

Apples.— Carolina Red June, Marengo Crab and Yankee.

Blackberries. Early King, Blower, French Lawton, Himalaya, Kenoyer, Mammoth and Ward.

CHERRIES. Abesse d'Oignes, Anglaise tardive, Anna Spath, Belle d'Orleans, Belle d'Franconville, Bing, Black Bigarreau, Brusseler Bruane, Bohemian Black, Baldwin, Choque, Dykeman, De Vaux, Early Lyon, Early Rivers, Florence, Gros Gobet, Jeffrey's Duke, Lambert, Mount Stark, Mercer, Mongui Mezel, May Duke, Ontario Preserving, Olivet, Paul, Reverchon, Rockport, Sylva d'Palluau, Terry, Timmie and White Heart.

CURRANTS. *Red and White*: Comet, Red Defiance, Wentworth Seedling and White bar de Luc. *Black*: Buddenborgs Black Prince, Carter's Champion, Gondouin, Ismay's Prolific and Ogden's Black.

GOOSEBERRIES. Alma, Broomlure, Chautauqua, Catharine, Companion, Criterion, Eagle, General Gordon, Lancashire Lad, Merriton, Preston Seedling, Red Champagne, Roaring Lion, Railway, Surprise, Shiner, Speedwell, Telegraph, White Swan, Warrington and Wilmot's Early.

GRAPES. -Black Alicante, Black Hamburg, Brilliant, Captivator, Chasselas avec Royal, Chasselas Vibert, Chasselas dou de Fontainebleau, Chasselas Gros Caulard, Cynthiana, Colerain, Dodrelabi, Elvira, Eaton, Early Ohio, Frankenthal, Feher Szagos, Forester's White Seedling, Flame Tokay, Gromier du Cantal. Gamay de Juillet, Lindley, Muscat Blanc, Muscat Noir Perkins, Precoce Malengo, President, Pense Malaga, Sanvignon Juane, Telegraph, Thaous, Victoria and Woodruff Red.

PEACHES. Alexis Sepere, Admiral Juane, Belle de Bordeaux, Belle Dauce, Belle Imperiale, Beauty, Coulombier, Cumberland, Cardinal October, Charles Ingouf, Dagmar, Dymond, Edward Andre, Exquisite, Earliest of All, Gold Mine, Gov. Hogg, Gladstone, Hills Chili, Illinois, La Vainqueur, Lovell, Louis Grognet, Madeline de Courson, Opoix, Red River, Rouge de Mai, Sea Eagle, Stearns, Stephens, Susquehanna, Townsend, Vilmorin, Waddel, Wilder and Willet.

PEACHES ON PLUM STOCK. Admiral Dewey, Captain Ede, Elberta, Niagara, Smith's Late, Crawford, Triumph and Yellow St. John.

PEARS. Admiral Gervais, Albertine, Alexander III. of Russia, B. S. Fox, Bordeaux, Bergamont d'Esperen, Chaumondel, Clarksville, Catillas, Col. Marchand, De Parennes, Durondeau, Doyenne Madame Th. Levavassen, Doyenne George Boucher, Fin Juillet, Fame, Fred Baudry, Gen. Stoessel, Gansels Bergamont, General Todleben, King Charles of Wurtenburg, King Karl, La Lectier, Louis Pasteur, Marguerite Marillat, Margaret, Notaire Lipin, Onondago, Ozark, Princess Copie, Passe Colmar, Princess, Pres. Heron, Pres. Casimir Perier, Pres. Roosevelt, Richls Best, Reliance, Sir de Jules Guindon, Stark's Winter, Snyder, Souviner du Pres. Carnot, Van Mons Leon Leclere, Winter Bartlett.

PLUMS.- Abbaye Tartan, Belgium, Belle de Louvaine, Belle de September, Belle de Paris, Cox's Emperor, Curlew, Daisy, Darwin Peach, Des Bejonniers, Femmonzie, Goliath, Gisborne, Hunt Hybrid, Improved French Prune, Omaha, Pitmaston, Poole Pride, Pearl, Pacific Prune, Robe de Sargent, Reine Claude, Gabriel Combes, Sugar Prune, Silver, Sultan, Stella, Spendor, Uncle Ben, World Beater, Wydale.

RASPBERRIES. Antwerp, Austin, Baumforth Seedling, Black Diamond, Cumberland, Columbian, Conrath, Clark, Carter's Prolific, Craigmiller Giant, Eaton, Eureka, Fastolf, Fillbasket, Gideon Queen, Gregg, Haymaker, Herbert, Iceberg, King, Kansas, Marlborough, Norwich Wonder, Northumberland, Ohio, Older, Premo, Pheonix, Plum Farmer, Red Antwerp, Sargent de Brune, Semper Fidelis, Superlative, Thwack, Stones Hardy, Souhegan.

STRAWBERRIES. Barrymore, Cobden Queen, Commonwealth, Clarke Seedling, Dew, Dornan, Enormous, First Quality, Fairfield, Fendall, Golden Gate, Green-

wood, Good Luck, Hummer, Heritage, Jim Dumas, Joe Wheeler, Kittie Rice, Mary, Mascot, Meton, Missouri, New York, Paul Jones, Pomoka, Phillips Seedling, Red Bird, Stahelin, Shipping King and Taylor.

In addition to these, a block of dwarf pears and peaches were set early in November, for the purpose of ascertaining the advantage or disadvantage of fall versus spring planting.

Orchard Culture.

The orchard culture test, mentioned in last year's report, was again continued this year. The results were even more marked, owing to the dry season, than we had anticipated, and visitors examining the orchard could at once tell the different blocks in experiment. The section on which the land was spring ploughed and sown to cover crop in July produced the healthiest and most vigorous trees and foliage, while the block in sod looked quite sickly in comparison.

Fertilizer Experiments

The fertilizer experiments commenced last year in conjunction with the Potash Syndicate were continued, and gave us very similar results.

Plot I	No fertilizer.	
Plot II	Complete,	5 pounds potassium sulphate. 10 " superphosphate. 5 " sodium nitrate.
Plot III		5 pounds sodium nitrate. 5 " potassium sulphate.
Plot IV		5 pounds potassium sulphate. 10 " superphosphate.
Plot V		5 pounds sodium nitrate. 10 " superphosphate.

The following is a brief summary of results, which will show that the yield may be increased by the use of fertilizer.

Tomatoes. Decided increase in yield by use of complete fertilizer, also slight increase where potash and phosphoric acid were used over no fertilizer. But in plots where potash and nitrogen, and phosphoric acid and nitrogen were used, the increased vigor of the plants lessened the yield of fruits materially.

Potatoes. While the result was somewhat misleading, it is evident that the plots where potash was used were better than those without it.

Corn. The plots where potash and phosphoric acid were used gave the largest yield of ears, the complete coming next. The use of nitrogen in this test also appeared to make the stalk at the expense of the ears.

Onions. The plots on which potash was used gave the heaviest and best bulbs. The plot having no potash, but with phosphoric acid and nitrogen, gave a very poor showing.

Cabbage. The complete gave the heaviest yields, while the one with potash and phosphoric acid came next. The plots on which potash and nitrogen, and nitrogen and phosphoric acid, were about equal.

Vegetables.

The following varieties of vegetables are some of the most promising we have tested. Some are old standbys and need no word of praise; others are new, and growers may do well to give them a trial as to their relative merits when grown alongside of old varieties.

Corn. Thomas Early, White Perfection, Early Champion, Country Gentleman, New White Evergreen, Zig Zag, Pearce's Early Evergreen, Golden Justice and Golden Bantam.

Squash. Summer Golden Crookneck, Dons Extra Early White Bush Scallop, Warted Hubbard, Golden Hubbard, Delicious and Long White Bush Marrow.

Musk Melons. Defender, Montreal Green Nutmeg, Dominion, Burrel Gem and Hamilton Market.

Water Melons. *Early*: Watson, Sweetheart. *Medium*: Black Boulder, Sugar Stick. *Late*: Seminole, Alabama Sweet.

Carrots. Half Long Scarlet Nantes, Rubicon, Scarlet Intermediate.

Beets. Blood Turnip, Edmand's Turnip, Early Model, Black Red Ball, Egyptian.

Potatoes. The following are the fifteen varieties giving us the largest yield of potatoes during the season of 1909 on plots of 1-100 acre, with a few notes on the same:

Variety.	Total Yield in lbs.	Market Tubers.	Small Tubers.	Per cent. of Scab.	Color.	Amount of Blight.
1. Davies Dunion	303	267	36	5	White	Slight
2. Davies Warrior	282	246	36	25	White	Slight
3. The Howard	267	239	28	75	Yellow	Touched
4. American Wonder	261	248	13	4	White	Touched
5. Robertson's Champion	252	206	36	15	Rose	Some
6. Rural Blush	250	218	32	15	Rose	Slight
7. Early Sunrise (Hewer)	244	223	21	90	Pinkeye Yellow	Slight
8. Up-to-Date (Hogg & Robertson)	243	228	15	12	White	Slight
9. Queen of the Hebrons	241	221	20	5	Yellow and Pink	Touched
10. Seedling Miss Rose	223	203	21	15	Bluish	Some
11. Wellington	213	193	20	10	White	Some
12. Extra Early Sensation	211	188	23	90	White	Some
13. Early Sunlight	209	184	25	98	White	Some
14. Empire State	205	180	25	90	White	Some
15. New Main Crop	203	152	51	70	White	Some

Tomatoes. The following twelve varieties are those which gave us the largest yield of fruits this year from sixteen plants on uniform plots, with notes on first ripening, size, shape, color, smoothness and total yield:

Variety.	Seedsman.	Total Yield.	Date First Ripe.	Size.	Shape.	Color.	Smoothness.
		Lbs.					
1. Bruce's Dominion Day	Bruce	214	28/7	Med. to Large	Round Flat	Red	Poor
2. Early Jewel	McCalla	204	18/8	Med.	Round Flat	Bright Red	Fair
3. Freedom	Simmers	196	3/8	Small	Round	Brick Red	Fair
4. Redfield Beauty	Bolg.	192	18/8	Med to Large	Round	Pink	Good
5. Ignotum	Bruce	186	3/8	Med.	Round Flat	Red	Fair

Variety.	Seedsman.	Total Yield.	Date First Ripe.	Size.	Shape.	Color.	Smoothness.
		Lbs.					
6. Livingston's Royal Red.....	Bruce	182½	18/8	Med.	Round Flat	Clear Red	Fair
7. Chalk's Early Jewel	Burpee	174	26/7	Large	Round Flat	Red	Fair
8. Duke of York.	Bolg.	170	26/7	Med. to Large	Round	Pink	Poor
9. Extra Purple Advance	Maule	165	26/7	Small to Med.	Round	Pink	Good Fair
10. Livingston's Hummer	Maule	162	14/8	Med.	Round	Red	
11. New Queen.....	Bolg.	161	14/8	Med.	Slightly Flat Round	Bright Red	Fair
12. Prize Taker.....	Bolg.	159	3/8	Large to Med.	Flat	Pink	Fair

Improvements.

With the completion of the Administration Building, with its offices and work rooms, we are in much better shape to conduct our work. We are looking forward to remodelling a barn which is on the place into a first-class fruit house, where we will be able to handle our various crops from time to time in a satisfactory and up-to-date manner.

The decoration of the grounds about the place is partly completed, and we hope that our surroundings will be in keeping with the best horticultural interests of the Province.

Beekeeping.

During the season of 1909 a small apiary has been added to our Station, and its work will be fully reported on by Mr. Morley Pettit, who has been in charge.

In closing, I wish to express my appreciation of the services rendered by those in connection with our work, and also to thank the fruit growers and farmers in this vicinity who have so willingly allowed us the use of their orchards for testing, and for specimens in connection with the work of plant improvement.

The following review of the progress in plant improvement has been prepared by Mr. A. J. Logsdail, who has this work in charge.

PROGRESS OF PLANT BREEDING AND IMPROVEMENT.

By A. J. Logsdail, Hybridist, Jordan Harbor.

Before summarizing the work carried on in plant breeding during the past year at this Experiment Station, I thought it might be advisable to review briefly the subject of plant breeding with relation to this particular phase of work, namely, the improvement of tree and bush fruits.

A Promising Seedling.

A Bed of 3,000 Seedling Strawberries. Plant-Breeding Work.

At the very outset of this work, during the summer of 1908, I endeavored to obtain from many fruit growers a more or less concise idea of a perfect fruit, whether strawberry, peach, plum, pear, grape or apple. I also endeavored to find out which two varieties together of these several fruits possessed the greatest number of the desirable qualities enumerated. The replies I received were numerous and varied, but throughout all there was a definite realization of the qualities necessary to a perfect fruit. The cross fertilizing (to secure seedlings) was carried out during the summer, with this information as a basis.

The information thus gleaned from expert practical opinion demonstrated the fact that, although the conception of an ideal fruit was fairly constant, the means of obtaining such were practically unknown. Realizing the possible variation in soil and other physical conditions in materially affecting the characteristics of certain varieties of fruit, it cannot be denied that the need of definite knowledge in this line of work is very great.

Plant breeding as a science is scarcely fifty years old; indeed, it is only within the past decade that it has actually attained to such a degree. The mass of literature upon this subject is rapidly accumulating, but up to the present investigators have devoted their energies chiefly to the improvement of cereals and other seed crops.

It is indeed doubtful whether the methods employed in the breeding of improved cereals are at all applicable to the improvements of plants grown from vegetative portions. Nevertheless, the time required to reach maturity by such fruits as the pear, apple, peach, grape and strawberry considerably lengthens the period of experimentation.

The improvement of fruits is by no means a modern endeavor. Horticultural records prove that many of the varieties of fruits now grown were first introduced more than a hundred years ago; but their appearance was doubtless due to fortuitous variations of such a distinct character as to attract attention. With our more modern appreciation of a possible scientific basis, and the present lack of definite knowledge regarding the character inheritance in successive generations of plants vegetatively reproduced, it is to be hoped that greater encouragement and support will be given to this most valuable branch of science.

The plant breeding at this Experiment Station may be conveniently classified under two headings.

The first or practical phase, comprising more than four-fifths of the entire work along this line, consists in the raising of large numbers of seedlings, from which improved or promising types will be selected. These seedlings are the result of systematic cross pollination. In strawberries and tomatoes, promising strains have been selected; this selection will be maintained for several seasons, when they will be tested beside the standard variety from which they were originally selected. We now possess about fifteen thousand seedling strawberries; about three thousand five hundred of these are now planted in the hill system under field conditions, the remainder are yet in the nursery frames.

A number of seedling peaches, pears and apples have made satisfactory progress during the past summer, and will be planted under field conditions in the early spring.

The second phase of the work may be said to be more technical, though as yet this branch has received but little attention, owing to the immediate and urgent attention required by the former. This second phase, I trust, may be developed considerably in the near future, dealing as it does with the essential principles of the work.

LAKE HURON FRUIT STATION.

By A. E. Sherrington, Walkerton.

The Season. The winters of 1908 and 1909 were comparatively mild, with very little snow during the whole winter, but owing to the mild weather during the winter all plants and trees came through in excellent condition. The spring opened up fairly early, with heavy and frequent rains until nearly the 1st of June; after this we had about two months of very dry weather. The rainfall during the spring and summer months was 24.77 inches, which was eight inches more than the season of 1908. The last killing frost occurred on April 10th, and the first killing frost on October 21st, 1909. The highest temperature during the summer was 91 deg. in the shade, and the lowest temperature during the winter of 1908-1909 was six below zero.

Insects. Insects were not so prevalent this season as formerly, with the exception of the green aphis, which was pretty bad on the apple trees. Codling moth was not nearly so destructive as in 1908, even in unsprayed orchards. In our own orchard the percentage of wormy apples was very small. This is no doubt owing to the materials used and the methods of spraying. As I have stated previously, I practise the method of clean cultivation. The May beetle is continuing to cause considerable damage to strawberry plantations and grass fields. Tent caterpillars and a few tussock moth were noticed, but they are kept well under control by spraying.

Fungi. The apple scab or black spot caused considerable damage in the unsprayed orchards throughout the district, but orchards that were properly sprayed showed a very small percentage of scab, and what there was, was found principally on the Fameuse and Early Harvest. The pear or fire blight was not nearly so destructive as last year. Some twig blight was noticed in Greenings and Alexanders. Fungi, on the whole, were not very prevalent during the past season.

Experiments. No planting was done at the Station this season, except where undesirable varieties and damaged trees were removed and the blanks were filled in with better varieties. One hundred cherry trees were added to the commercial orchard.

Experiments in Commercial Fertilizers. Five plots, containing quarter of an acre each, were laid out. This experiment was supposed to be conducted for five years, but as there is only one crop of strawberries taken from a plantation, the experiment cannot be carried on more than one year in strawberries, but can be carried on for a number of years in the raspberry plots. On May 8th the fertilizers were applied, with the exception of nitrate of soda, which was applied on the 12th. Plot No. 1 had no fertilizers. Plot No. 2, 40 lbs. muriate of potash, 75 lbs. of acid phosphate, and 30 lbs. of nitrate of soda. Plot No. 3, 75 lbs. of acid phosphate and 30 lbs. nitrate of soda. Plot No. 4, 40 lbs. muriate of potash and 30 lbs. nitrate of soda. Plot No 5, 40 lbs. muriate of potash and 75 lbs. of acid of phosphate. The results have not been very satisfactory, perhaps largely owing to the very dry spell during the months of June and July. There appears to be no benefit from the application of those fertilizers, whether on strawberries or raspberries; in fact, we thought there had been some injury done to plants in the strawberry plots, as a large number of the plants dried up and were killed out completely, but this may have been from the excessive drouth. On the raspberry plots no improvement would be noticed either in plants or fruit.

Strawberries. The strawberry crop here was a failure this year, owing to the dry weather during the fruiting season. The varieties grown are Brandywine and Williams.

Raspberries. The raspberry crop was never better, as we had plenty of rain while the berries were ripening. The varieties grown commercially are Marlboro, Herbert and Cuthbert. The Herbert is doing well, but we find it too soft for shipping any distance. The Cuthbert still holds first place as a commercial berry.

Currants. The currant crop was excellent this season; nearly all varieties did well. We have now between forty and fifty varieties of red and black. Some varieties are not fruiting much yet. Red Cross, Fay, Cherry, Wilder and Perfection are the best varieties of red currants. Perfection is promising well. Champion and Naples are the best among the blacks.

Gooseberries. Gooseberries, of which we have now about 1,000 bushes, with nine varieties, Pearl and Downing are the only two varieties that are proving satisfactory commercially.

Cherries. The cherry crop was excellent this season; all varieties did well. Among the sweet or eating cherries, Yellow Spanish and Windsor have proved to be the best; of the sour or cooking varieties that are giving the best results are Early Richmond, Olivet and Montmorency, given in order of ripening, but the Early Richmond and Montmorency are the best commercial varieties, Montmorency being the best of all.

Plums. The plum crop was very good this season, with good quality. Among the best varieties are Bradshaw, Purple Egg, Quackenbos, Imperial Gage, Burbank, Yellow Egg, Monarch and Grand Duke. We have about twenty seedlings; some of these fruited this season, and a few of them promise to be of good value.

Pears. Pears are not doing well. The blight has destroyed quite a number of trees. All the French varieties are gone. The young trees made good growth this season, and we are in hopes that the blight will not be so bad in years to come.

Apples. The apple crop in this district was quite a heavy one this season, but the fruit was small, in unsprayed orchards quite scabby. It was difficult to get 50 per cent. No 1's. The apples at the Station were not large, but clean; still the percentage of culls was large owing to size, the Spys being too heavily laden. The experimental orchard is coming into bearing nicely, but there are a great many undesirable varieties that will either have to be grafted or removed. Quite a number of trees of different varieties have already died, showing lack of constitution. Canada Baldwin, Wine Sap, Ontario, Cranberry Pippin, have died or are dying. We are working over a number of trees to better varieties. The varieties that are doing best are Hulbert, Peter, Wealthy, McIntosh, Shackleford, American Pippin, Scarlet Pippin, Stark, North-west Greening. We did not keep a record of the yield of any variety, but that can be done if thought necessary.

ST. LAWRENCE FRUIT STATION.

By Harold Jones, Maitland.

The winter of 1908-9 was very even in temperature, but very little or no snow to protect the ground from freezing during the cold months. Ploughing was continued up to December 3rd, the ground remaining frozen from that date to April 10th. The lowest temperature recorded was 15 deg. below zero on January 13th.

The months of April and May were cold, wet and stormy; seeding did not become general until May 20th, and apple trees were in full bloom on May 30th, or 15-18 days later than normal. Apple trees came through without injury to wood or bud. European plums were injured in fruit bud. Cherries had a few buds injured, but a fair crop set fruit. Pears are nearly all dead. Russian varieties and Flemish Beauty set fruit that came to maturity.

For spring planting I received from Prof. W. T. Macoun, Central Experimental Farm, Ottawa, twelve apple trees two years old, and eight varieties of plums. I have now planted in 1908 and 1909:—

Apples: Allen's Choice, Langford Beauty, Mendel Newton, Patten's Greening, Pesaukee Russet, Stone, Walter.

Plums: Bestovall, Bomberger, Don, Fitzroy, Gloria, Lisher, Mollie, Sunrise, Golden Queen, Consul, Swift, Bixby, Odegard, Mankata, Aitkin, Cheney, Smith, Admiral Schley, Lunn, Howards, Yellow, Ockheda, Hawkeye. These give a very representative collection of some of the best of the American type of plums.

Insects and Fungi.

Insects gave very little trouble. Codling moth was controlled with one or two sprayings. Tussock moth was controlled at the spraying following the falling of the blossom, care being taken to spray well into the centre of the tree, reaching the tender foliage and tips of the water sprouts, where they are usually found in greatest numbers. Oyster shell is on the decrease where spraying with Bordeaux is continued from year to year. There was very little "spot" on apples; many unsprayed orchards gave crops of clean fruit. The fire blight appeared on some varieties of apples. Canada Baldwin, N.W. Greening, Blunt and Switzer suffered most.

Apples.

The apple crop this year was not large, but the quality was very fine. The bloom was scattered on the trees and fruit set very evenly. Wealthy blossomed and set a scattered crop, which resulted in fruit of much better size and quality than I ever before raised. Next year, if there is a heavy setting of fruit, I will do some severe thinning to compare results. The Fameuse orchard, grafted on McMahon with scions from the parent tree of solid red type, are starting to bear, and are proving true to type so far as fruited. McIntosh at twelve years of age are yielding a barrel to a barrel and one-half to the tree. They commenced bearing at nine years planted, and have gradually increased. On heavy clay loam they do not get the high color obtained on sandy soils or light loams.

The Wealthy is another apple that succeeds best on light soils. The fruit is better flavored, higher colored and larger sized than anything I have ever seen on heavy clay loams.

Of the newer varieties that fruit this year, with me the Milding is the most promising. The tree is healthy, vigorous, with large dark green foliage and appears quite heavy and free from disease at eleven or twelve years of age. The fruit large, 3 inches across the core, oblate, stem ¾-inch, cavity narrow, deep, calyx closed in a broad shallow basin. Color bright yellow streaked and splashed bright red. Flesh, light yellow, breaking, juicy, brisk subacid, good, season January-February. This apple may find a place here in the east where a bright crisp apple is in demand in midwinter.

Winter St. Lawrence is vigorous and hardy but is a very shy bearer, and would not prove profitable where Fameuse and McIntosh will grow. Milwaukee gave a light crop this year, but the trees remain healthy and vigorous. This apple last January and February brought good prices on the local market for cooking purposes.

Shiawassie "top-graft" fruited with me this year and gave some very handsome specimens. The tree seems hardy and vigorous and may prove of value. Canada Baldwin at one time promised very favorably, but the trees have been suffering with blight (twig blight) for two years and are now on the road to decay. It is a showy apple of low quality but sold fairly well. I cannot recommend the planting of this variety.

My notes on varieties published in previous reports are in the main correct.

Pears.

None of the Experimental work has been so disappointing as the pears. Out of over forty varieties planted at this station for test, there is only one Flemish Beauty and a few worthless Russians living at present. The climate is decidedly too severe, and I am satisfied they will never be a commercial success. For amateurs the Flemish Beauty and Clapp's Favorite will give the best results when planted in a sheltered position and kept in sod.

Plums.

European Plums have been a failure to the same extent as pears. All varieties are dead except Glass Seedling and this variety has never borne a crop, the fruit buds being injured every winter. Lombard and Gueii will give one crop and then die. I have three varieties of European type from the Island of Montreal that are growing nicely but have not fruited yet, viz., Raynes, Mount Royal and Lunn.

American Plums are hardy here and I now have a representative collection of twenty-one varieties, one and two years old, some of which will come into bearing at an early age, when I hope to be able to report something of value to the fruit growers and gardeners of this section. Hammer has been giving regular crops since 1899 but is beginning to show signs of age and decay. The fruit is light red, medium, thick skin, fair for cooking.

Cherries.

The cherry crop was fair. Montmorency gave a fair crop of good fruit. English Morello a light crop, Orel a fair crop, but the fruit is too small and not desirable where Montmorency succeeds. Ostheim is a healthy tree but has never borne a crop. It has proved worthless to me. Olivet is tender in fruit bud and has only given a few specimens once in twelve years. May Duke, Rhene Hortense, Black Knight, Dyehouse and Gov. Wood are all tender.

Currants.

Red. Cherry, Raby Castle, Versailles are all good, profitable varieties. Fay breaks down too much and is too short in the bunch. Pomona makes too thick a bush and requires too much thinning. Wilder is too late with foliage too heavy and is very subject to Aphis.

Black.—Victoria, Lees and Champion are all good, giving good bunches, ripening early down the stem. Champion gives the largest fruit.

Raspberries.

The Herbert is proving a very hardy and prolific variety, the only red raspberry that will stand our climate without protection. All other varieties have killed back to the snow line every winter. Older is the hardiest of all black caps, a handsome fruit and prolific but of a sprawling habit.

Commercial Orchards.

My commercial orchards consist of about 21 acres, viz., Fameuse, 11 acres; Duchess and Wealthy, 3 acres; McIntosh and Scott's Winter, 2 acres; Scarlet Pippin and mixed, 5 acres; total, 21 acres. This acreage runs in age from 29 to 8 years of age.

From a careful record of sales made from the product of four acres of Fameuse planted in 1881, dated from 1894 to 1903, a period of nine years, I received an average net return of $800 per annum after paying all expenses except the cost of barrels.

The largest gross returns any one year was $1,310 in 1903. In 1903-4 the orchards were injured by the severe winter, and since that time my gross receipts have been $400 to $900 per annum from the same four acres. The average yield of a mature Fameuse under high cultivation runs from 4-12 barrels per tree. Scarlet Pippin has proved with me quite as profitable as Fameuse, but the trees suffered more in 1904 than the Fameuse and require very prompt harvesting as soon as ripe to avoid dropping. McIntosh takes longer to come into bearing than Fameuse or Scarlet Pippin but give excellent yields when they attain age and are hardier than either of the above.

These three varieties have so far proved to be the money makers for the St. Lawrence valley. Following these in order of commercial value come Wealthy, Baxter and Tolman—all good trees that live to an old age and the fruit finds a ready sale.

To keep the trees in a healthy vigorous condition and secure large crops of full sized fruit, it is necessary to maintain a thorough system of cultivation with fertilizers. Cultivation, if continued late in the season produces a late succulent growth that is subject to injury the following winter, but cultivation in the early spring and continued through May and early June and then the ground sown to a cover crop keeps the orchard in a vigorous condition with well ripened wood and fruit buds in the fall. In other words, early cultivation with early sown cover crops produce vigorous trees with fully developed fruit with fall conditions similar to sod, which experience has taught us, produces a well ripened and finished terminal growth. Moderate application of barnyard manure applied every second year produce the very best results, but where this material cannot be obtained in sufficient quantities good results can be secured by the use of muriate of potash and acid phosphate and cover crops of clover or vetches.

Orchardists must not forget the very important fact that in a heavy crop of apples there is a greater drain upon the available plant food in the soil in the production of seeds alone than there would be in producing a full average crop of wheat from the same area.

When we consider the care and consideration given to rotation in our grain and other farm crops to maintain the fertility of our soils and produce the best results, a little thought will convince the most thoughtless that fertilization is most necessary, or trees in bearing will soon be standing in impoverished and exhausted soil.

SOUTH-WESTERN FRUIT EXPERIMENT STATION.

By J. L. Hilborn, Leamington.

The season of 1909 has been an unusually favorable one for the Fruit and Vegetable growers in Essex County. The previous winter was favorable for fruit trees, bushes and plants of all kinds, and as we had no spring frosts to damage the blossom, peaches were an excellent crop.

Fruit.

The trees planted for variety test were too young yet to bear much, a few of the trees had failed but the majority have made a good growth and a few of them showed some samples of fruit this season but not enough to report on.

Should the season be favorable I hope to be able to report on some of the newer sorts next season. I have somewhat over twenty acres of peaches planted for commercial purposes, the majority of which were not old enough to bear much this year. But these young orchards as well as many other young peach orchards, in this vicinity, made a big growth. and with favorable seasons will soon be producing a good quantity of fruit.

The San Jose Scale is widely distributed through this section, and although nearly every grower sprayed with the Lime-sulphur solution last spring, some growers complain that the scale is very numerous again this fall.

At the station farm we used Commercial concentrated solution this season, but the majority of growers used the home boiled article and I think it gives better results at a lower cost. Although I had very good success with the Commercial brand I think it more expensive and not as reliable. I diluted it one to eight, and when used early enough it completely controlled the curl leaf but was not satisfactory in killing the scale.

Peaches All our peach trees produced a good crop except a few trees which I have of the St. John, which will not bear for me, and about one hundred large trees which I have of the Garfield—it is a good grower and produces a few fruits of very large size and fine appearance but does not bear enough to be profitable.

The Dewey did well, it is very hardy and a great bearer—is best of its season.

Barnard, when thoroughly pruned and cultivated, produces a fair sized fruit of excellent quality, but this season we had heavy rains followed by very warm weather at ripening time and received complaints of the fruit not keeping well in baskets.

New Prolific and Engol ripened together this season, picking from September 14th to the 24th. Both these varieties do exceedingly well here, being large, well colored, of good quality and producing heavy crops. They are easily the two best varieties of this season and are much alike.

Elberta comes in just after them and also does well here but has not been planted much of late years.

Kalamazoo which ripens with Elberta does so well here that it has been much more planted in the new orchards than the Elberta, being a stronger grower, less subject to leaf curl and for these reasons a heavier yielder.

Banner and Golden-Drop ripened together this year and while the other varieties were a week later this season than they were last year, these two sorts

were about a week earlier than they were last season—a peculiar incident which I cannot account for. These two varieties if well pruned, thinned and given good cultivation grow to a good size here, and yield an immense crop but the Golden-Drop does not take as well in the market on account of its lack of color.

The Lemon about ends the season here—it is still one of the best for canning purposes.

Salway is grown to some extent but is too late as a rule to be as profitable as other varieties.

I am still practising the method adopted five years ago of using a mulch of old straw around each tree as a preventative of root freezing, should we get another severe winter. On my bearing orchards this is allowed to remain and we cultivate all space not covered with mulch.

A portion of one young orchard was sown to hairy vetch on July 24th, 1908, this grew very rapidly and made an excellent cover crop, was allowed to grow until late in May, at the time it was plowed under it had grown to such a size that it was difficult to cover. By using a disc cutter and a heavy chain we were able to get a fair job done. After plowing it was thoroughly pressed down with a roller and kept well cultivated until July 23rd, when it was sown to a mixture of corn and oats as a cover crop.

Both trees and cover crop on the portion of the orchard where the vetch was used (about two acres) made a very rapid growth, and if one can judge by this and the very dark green foliage of both trees and cover crop would say, the hairy vetch is a great nitrogen gatherer.

As the corn sown this season where the vetch was turned under grew to the height of seven or eight feet—we had more cover crop than we thought necessary so cut a goodly portion of it for feeding purposes.

Plums. The plum trees planted for variety test are mostly growing well but have not borne yet. I have some two acres of Burbank Plums (old trees) which blossomed heavily but produced no crop. The few European Plums that are planted here produced a good crop this season.

Blackberries. Several varieties of Blackberries are being grown at the station for experimental purposes also for commercial purposes. Another season is needed before reporting in full. This season Mersereau, Kittatinny, Elderado and Snyder did best in order named.

Raspberries. A dozen plants of each of the following varieties were planted as variety test on this soil, they were in full bearing this season: Gregg, Cumberland, Galt, Eureka, Hilborn, Kansas, Conrath, Alder, Palmer, Marlboro, Golden Queen, Cuthbert and Columbia. Most of these produced a good crop, the exception being Cumberland which does not have enough seeds to make a compact fruit. And Alder, which is so poor a grower here as to be worthless. Kansas, Hilborn, Palmer and Galt were best in order named—the two former produced an excellent crop of fine fruit of good quality and did best of any this season. I think a plantation of either of these sorts would be profitable in this vicinity. Columbia is the strongest grower of any berry I know, it has immense canes and produces a big crop of purple fruit of good quality for home use but too soft for market.

Currants. The following varieties of currants are being tried here: LaVersaillis, Wilder, Cherry, Fays, Chautauqua, White Grape, Black Champlain and Black Victoria, all of which made a good showing for this the third year from planting. Another season is needed to judge which is best suited to this soil. Cherry, Fays and LaVersaillis all made an excellent showing, also Black Victoria.

Judging from this season I would say that Red Currants of these varieties would be a very profitable crop to grow here.

Peaches on Plum Roots. In the spring of 1909 I received from your Department some forty peach trees that had been budded on plum roots in the hope of getting trees that would be better able to withstand the severe test that the roots of our peach trees are sometimes subjected to when we get severe freezing, as we sometimes do when we have no snow to protect them.

The majority of those trees made a good growth, fully as good as one could expect from any peach trees the first season. These trees had been budded some eight or ten inches above the ground and the portion of the stock below the union does not grow as fast as the peach stock above it, but as the plum wood is much firmer and stronger this may not be much objection, except its odd appearance. My impression is, however, that they would be more satisfactory if budded as close to the ground as possible. These trees will be watched with interest as they acquire age and come into bearing.

Gooseberries. Six plants, each of five varieties of English Gooseberries were planted in the spring of 1908. As the plants had been imported and had apparently been heated on the way, quite a number of them failed to grow and the others did not start well. All that grew bore fruit this season, all of which were clean and a nice sample, but it is yet too early to say much of their relative value. The White Smith did best this season, the best plant yielding one quart of very large fine berries. The plants were thoroughly sprayed in the spring with the lime-sulphur solution, which is claimed will keep the plants free from mildew, a disease which heretofore had prevented the growing of these fruits in Canada.

Vegetables. The season of 1909 was a record year for the vegetable growers of the Leamington district. While the spring was rather wet and backward here it was much worse in other places, and as our soil dries very quickly our crops were about as early as usual. Early tomatoes produced an immense crop of much better than average quality, and as they came in much ahead of the crops in other parts of the country the price was better than usual and held up longer, making this the best season on record for the average grower of early tomatoes. The old reliable Earliana still holds first for profit. This season we grew some two acres of a new variety called I.X.L., procured from J. Bolgiano & Son of Baltimore, Maryland. They are said to be much earlier than Earliana, with me it was about as good but no better. A strain of seed selected by W. T. Macoun of the C.E.D., Ottawa, was tested, which proved to be a stronger grower and heavier cropper of fine fruits than anything else at the station farm.

We had about six acres of Musk Melons again this season. As usual most of the plants were started under glass and twice transplanted before going to the field. For a portion of the crop the seed was planted where it was to grow, both methods did well this season.

A few years back the melon growers were badly handicapped by the ravages of the Melon Louse or Aphids, which were so numerous some seasons as to destroy much of the crop. There were very few last year and scarcely any this season. It was very noticeable that there were a very large number of Lady-bugs or Lady-birds on the plants both seasons, and I give these the credit of destroying the first broods of the Aphids, and if these are destroyed there is no more trouble for that season.

Early Cabbage and Cucumbers did well again this year—it is quite evident that this district is destined to keep the lead in supplying Ontario markets with

certain varieties of early vegetable for which our soil and climate are peculiarly adapted.

Asparagus. About two and one-half acres of Asparagus was planted at this station in the spring of 1908, part of which was set with plants bought from an Asparagus specialist in New Jersey, but the greater portion of the field was set with plants grown from seed, started in the greenhouse and removed to the field early in June. Both plantings grew well and give promise of a good crop next season.

Vegetables Under Glass. The Tomato seeds for this purpose were sown December 19th, 1908, twice transplanted and were benched on March 11th. At this time they were large, strong plants, showing considerable bloom. Although we attempted to keep the blossoms well fertilized much loss was sustained from the plants dropping their blossoms, they did this to such an extent that the crop was not very good, especially on some varieties. One variety, a very fine, smooth, pink colored fruit, secured at Grand Rapids, set well and produced an excellent crop. Of the others, Chalks Jewel, Best of All (Dreers), Earliana and Wealthy did best in order named.

The seeds for the cucumbers were started January 20th, were twice transplanted, last time in six-inch pots, one in a pot, and grew well. These were benched on March 19th, and were then about twenty inches high and showing a few blooms. These grew well and produced a fine crop.

A specially selected strain of White-spine secured in Grand Rapids did best, followed by Burpee's Extra Early White-spine, Arlington and Klondyke. There is a good demand here for these crops at good prices.

As I have never been able to make satisfactory returns from the growing of lettuce in winter I have this season undertaken the growing of carnations, but so far am not at all sure that they will be any more profitable than the lettuce.

Cabbage. Seeds for our crop of early cabbage are started about first of March. They are grown at a lower temperature than are the other plants, for if given much heat they grow tall and soft and do not stand handling well. I prefer to transplant the plants twice while under the glass, giving more room each time. Some growers, however, transplant but once before going to the field. I like to get the plants out into the cool frames soon as hard freezing is over in April to get them well hardened off and to remove to the field as soon as the land is in good condition for planting. The Jersey Wakefield is grown almost exclusively for this purpose, and if good plants are grown and planted on good soil that has been well enriched satisfactory results are usually attained.

Cucumbers. For the cucumber crop that is grown under glass after the other vegetable plants have been removed to the field, the seeds are started in flats in April and are twice transplanted, so we have large stalky plants which are benched in rich soil and given good heat and plenty of water and should be trained upon trellises of wire or binder-twine, and if properly looked after usually produce a good crop. Almost any of the varieties of the whitespine type are good for this purpose. Each grower has his favorite. As a rule any of the medium sized varieties do about equally well.

Tomatoes. For the crop that is grown in the field for first early, the seeds are started same as described for the other vegetables about March 1st and are transplanted three or four times, giving more room each time, and the last transplanting they have reached such a size that it is necessary to give them each a space of 5 by 5 or 6 by 6 inches.

I like to get them well hardened off by the time weather conditions are such that we can remove them to the field, as the earlier they can be got into the field after the last frost the earlier the crop will be. In preparing the land for planting I mark out the field 4 by 5 or 4 by 6, some plant closer, but I prefer this distance. We cultivate and hoe frequently as long as space will admit of it.

If the land is not already rich enough a light dressing, say about one teaspoonful of nitrate of soda applied directly around each plant and hoed in soon as possible after planting will help to start them off quickly.

Melons. For this crop I prefer to get the land well filled with humus and brought up in a good condition the previous season. Plough in early spring and work down well. Some prefer to mark out both ways and fix up a hill at the intersection by working in some rotten manure or commercial fertilizer. I seldom practice that method, preferring to have the land all well fitted, and if not quite good enough add a little around the plants after planting, or hoe in a little when putting in the seeds.

Where seed is planted directly in the field I like to get it in about May 1st, also start seeds under glass about same time. The latter come more quickly, but as they are transplanted twice and held back a little in that way they come in about right. The seeds are started in flats or trays and each time are transplanted into other flats giving more room each time. The last setting we put enough for eight hills (two plants each) in each tray or flat which are 12 x 22 x 4 inches. By setting them in pairs and being careful when removing to the field they usually do well. Our best commercial varieties are the different types of Hackensack, also Rocky Ford for green flesh, and Orange, Hoodoo, Burrel's Gem and some others in the yellow flesh sorts. We have tested many different packages for shipping melons, and find the bushel basket answers the purpose fairly well, but prefer a crate made 12 x 12 x 20, holding one bushel. We are able to buy the stock in the flat from the local basket factory and make them up during winter. We are at present making up 2,000 of these crates to be ready when the season arrives.

ESSEX VEGETABLE STATION.

By E. E. Adams, Leamington.

I have to report to you in regard to the work carried on at the Essex Vegetable Experimental Station for the past season, that the work as laid out has been carried on as per instructions, and that in all probability good results will be obtained in the near future The varieties under test for seed selection are: Peppers, Chinese Giant, Neapolitan Early, Ruby King, and Long Red. Potatoes, Manistee, Early Ohio, Early Rose, Bovee and Burpee's Extra Early. Sweet Potatoes, Gold Skin, Yellow Nansemond and Jersey Sweets. Seed from all these has been selected for next season's growing, and all of which will receive careful attention as to future selection in order to demonstrate that careful selection will increase the crop both as to quantity and quality.

The main idea in selection of seed of the above, is to make selections from each crop, selecting only the smoothest and best shaped specimens and taking them for or taking seed from them for a series of seasons, in order to show beyond a shadow of doubt the desirability of selecting only the very best types for re-

seeding. This has been amply shown, I believe, in selection of seed corn, and there is no doubt that the same may apply to the seeds on which I am at present working. Tomatoes as a rule are grown for seed by large growers, but no attempt is made to improve the quality of the seed but rather to produce a crop of seed and no particular pedigree attached to it. We find a large proportion of the seed sown produces tomatoes rather too rough to be considered good marketable stuff, and in consequence growers lose considerable money each season from this rough fruit. If the quality of seed can be improved with proper and careful selection, not only selection of the smoothest fruit, but due consideration as to the type of plant from which the fruit is taken, I have no doubt that a much more desirable strain of seed will be produced, and which will in return produce much more desirable crops both in quality and quantity per acre.

The past season here has been a very good one for almost all crops, but onions suffered from heavy rains early in the season, and in consequence the crop was about one-half as compared with 1908, and the quality also is not up to the required standard. A considerable portion of the crop ran to thick necks, caused, we think, by late planting. We note this year that where seed was sown early, and not washed out by heavy rains, that the crop is first class, and where sown late the crop was thick necks to a great extent, but while we think that this is the cause of so many thick necks, yet it might be caused by some other conditions of which we are unaware, but it appears that the late sowing is a cause which should not be lost sight of.

The potato crop is one of the largest and best raised here for several seasons, and other crops have turned out very well.

Skinner irrigation was tested on carnation growing in the field, and it goes without saying that had water not been applied when absolutely needed, that the crop would not have turned out as well as it did. This means of irrigation is one of the safest investments as well as one of the surest methods of growing large crops, that it must come into larger use here in Canada as soon as a practical demonstration is made for vegetable growers.

It was my privilege last winter to look over a great many irrigation plants in the State of Florida, where I went to inform myself at first hand, and what I saw there fully convinced me of the great utility of this method of growing garden crops. The cost for installing this system will run from $250 to $300 per acre for piping and nozzles, valves, etc., beside the cost of pumping rig of some description. Some of this system is now working here in Green House work, as well as some outside and is very satisfactory.

I should have noted above that Tomatoes are also under selection. The Earliana, Stone, Bonny Best, Early Jewel, First of All and Maule's Extra Early, all of which do well in this district.

ALGOMA FRUIT EXPERIMENT STATION.

By Chas. Young, Richard's Landing.

The past season has, on the whole, been favorable. Spring was rather late with some hard frosts, but vegetation was not far enough advanced to be materially injured. Perhaps strawberries uncovered suffered the most from freezing and thawing, and I think it would have paid this year to have covered them the

previous fall, specially so, as the stand of plants was with many varieties rather thin. There was no new stock planted here for experimental purposes. A quantity of scions and plums failed for some reason to come to hand. Experimental work was chiefly confined to making use of and disseminating information already obtained.

In the latter, I think this station has been fairly successful judging from the number of inquiries sent in and letters answered, some of which were from British Columbia on the west and Parry Sound on the east. A noticeable feature in correspondence was that in the newer districts failure was conspicuous, while in the older settled parts when suitable varieties are planted and when fruit growing is more of a science and almost every farm has its little orchard, and when one man tries to grow a little finer fruit and a little more of it than his neighbor across the road, and last but not least when fruit of all kinds meet with a ready sale direct to the consumers at prices 25 to 50 per cent. above what could be obtained in Toronto, failure, unless in experimenting or some other reason the cause of which is seldom difficult to find out, is very rarely spoken about.

I do not mean to say that we have a perfect climate or soil for growing fruit. Far from it. We have some disadvantages here that growers to the east and south of us know but little about. These are being gradually overcome, and I sometimes think and oftener say that fruit growing like wheat growing is moving west to find a more congenial climate. Be that as it may, we certainly know little or nothing of many of the difficulties encountered in what is called the more favored districts. Injurious insects, and fungi, such as black-knot, are scarcely known here. True, we have the oyster-shell bark louse, far too much of it, and the aphis. But these are both easily controlled. Given suitable varieties as far as apples, cherries and small fruit are concerned, I see no reason why a stretch of country of some hundreds of miles along the north shore of Huron and part of Superior should equal if not excel any other part of Ontario. This may seem a doubtful statement, but I am quite satisfied it is a correct one. Unfortunately as far as apples are concerned, we have nothing to take the place of the Spy. I have tried and failed to grow it as a top-graft, I cannot get the wood well enough matured in the fall. I had some hopes of succeeding with Ontario as a substitute. I had the trees bearing, but a hard winter a few years ago killed them down to the snow line. They have started to grow again and promise to make better trees, being lower headed. The tree bears, and even if its lifetime is short, is well worth further trial in filling a space that is now blank. It is no use top-grafting on the Tolman as the Tolman as a stock is not sufficiently hardy. And although it is absolutely necessary that the stock should be as near as possible proof against sun scald I am quite satisfied that it imparts little or nothing of extra hardiness to the top, that is, as far as frost resisting power is concerned. The winter of 1908-9 only went once 30 below. In some previous winters over 40 below was registered, but while such a low temperature may kill a peach it has little or no effect on an apple, but think two or three days of drying wind with the thermometer at zero to be more dreaded.

In my old orchard, planted twenty-seven years ago, I spray for scab and find it necessary in ground later planted, part of which is reserved for experimental purposes. There are several McIntosh and Louise that have never been sprayed. We are using them now, January 1st, and not a spot can be found on an apple. The old orchard is surrounded by a belt of spruce 35 or 40 feet high, which was planted far too close to the trees, while the newer part has no shelter for a considerable distance. I do not say that this is the reason for these trees being clean, I am only stating facts which I point out to interested visitors.

Now, in regard to raising an orchard from the start, supposing the hardiest kinds are planted, we may safely count on having a larger proportion than in more favored districts, even if given the best of care. When a tree has arrived at bearing age it is comparatively safe, that is, an apple tree, not so much with a plum. They seem to thrive vigorously until coming into bearing, when all at once the whole tree dies right to the ground. This is specially so with Japans. The Europeans, those that survive that far, will carry a few crops and then die, but by selecting the hardiest among them I would prefer to plant European rather than Japans. As to markets, I have never seen a glut in fruit of any kind yet. We can pretty well supply local markets, beginning with strawberries and ending with apples, up to the New Year, after that imported apples will be wanted. Strawberries this year had to find a new outlet. We had previously depended on local trade. New markets were not hard to find, and thousands of crates more could have been sold at highly remunerative prices.

The above is a summary of progress at this station and requirements of the district, and to this I may add that our local fruit still commands a much higher price than the imported article. While we are not any more honest, our fruit as a rule is cleaner and better and worth the difference in price.

The question of adaptation is not yet finally settled, but hardiness is the first quality to look for. I think that the advice given to fruit growers has been as a rule too general, and that now attention should be given to the special conditions which prevail in different districts, so that any advice or suggestions that I may give will only apply to this locality. For instance, I would advise planting low headed trees; give clean cultivation until they come into bearing; do not prune the head too open; protect the trunk and lower limbs with building paper or a thick coat of lime wash applied about the middle of March to prevent sunscald. Seed down thickly with red clover so long as the clover stays in the ground. The varieties that we can depend upon are mostly of little value in the older districts, but the quality and general appearance is better and our market has and will take all we give for years to come. A fair sized apple, if clean, has always found a ready purchaser, even if marketed in 11 quart baskets. This entails some work, but the difference in price pays. What we have been and are still looking for is a long keeping winter apple of fair appearance and size. Those we have at present have serious faults. Scott's Winter is small, Wallbridge although a good cooking apple is a poor dessert apple. Pewaukee drops its fruit badly, and has a poor appearance in the package. Another is too small or shrivels in the cellar if kept dry, and so on through the whole list. I think we should pay more attention to the individuality of fruit trees, especially in the north, and propagate from those which have proved themselves hardier than others of the same variety. The difference may not be very noticeable in more favorable climate, but is very evident here in all tree fruits and especially so in the apple.

Apples. Apples were perhaps the heaviest crop we have had for some years. Owing to the early part of the season being very dry it looked at one time as if the fruit would be undersized, but with the exception of Yellow Transparent all others were large and clean. Crab apples especially were an enormous crop and no more of them could be planted. There is enough to fill the demand. Among these Isham, a variety not extensively planted, stands prominent in regard to quality. The original tree came from Prof. Budd. This is probably the finest crab as well as the handsomest, but it scabs readily, and to obtain clean fruit has to be covered with Bordeaux until the fruit is fully grown. I have thirteen varieties, and this is the best in appearance and quality. Not quite so

heavy a bearer as Hyslop, which is the principal crab grown for the market. Although I have advocated top-grafting trees of kinds not suited to this climate and would do so still, the results have not been quite what I have expected, and it is just a question with me if it would not be better to dig the whole thing out and plant something hardy from the ground up. Winter St. Lawrence and Baxter are two apples that have done well with me, and for variety should be more extensively planted. Of course the money-maker is the old Duchess. It may always be depended on, and the fruit is off the tree before the rush of packing begins. North Star extensively planted is a good apple and follows the Duchess and many prefer it. Alexander is much inquired after. With me it has not been one of the most profitable. The tree may carry a heavy crop but seems to then want two or three years to recover. Wolf River a little later seems to bear more regularly but the trees here are just well into bearing.

Louise, not extensively planted, is a very fine dessert apple, and sufficiently hardy to stand the winter. Godwin extensively planted is very hardy, an hardy bearer of good sized fruit, not so apt to rot at the core here as it is when grown further south. Longfield very extensively planted. I am top-grafting. It is an early bearer, but the fruit is too small and a slight bruise shows up very quickly on the fruit. Would not plant any more of them, although on good rich soil and the fruit well thinned out a fair sized apple may be had.

Wealthy and Peter fill in the season from late fall to early winter and are reliable—none better in this season. Pewaukee I have not found so thoroughly hardy as is usually supposed. Scalds badly on the south side of the tree. Scott's Winter has the same fault. The fruit is rather too small and needs to be cared for in order to obtain fair sized fruit.

These are only a few of most extensively planted apples, probably as many more could be given, and unless there is something specially good a better cooker than Duchess and a better dessert than McIntosh or Fameuse, there is no need to multiply varieties. The hardiest variety that I know of is Charlemoff, rather a handsome fruit coming in just before Duchess but its season is very short. I have fruited Milwaukee. As a top-graft it certainly makes a fine growth, but I have been so often mistaken in giving an opinion from the first fruit that I cannot say much about it, only it is well recommended when it is grown as a winter apple, the top seems to be quite hardy, and if a top-graft should be put on such a stock as McMahon. Perhaps this may be our future winter apple until we get a better.

Pears I may set down as a failure or very nearly so. The varieties that we can grow are of very little commercial value. There are a few good trees grown under favorable conditions, but they are an exception. Some had a few fruits before they died, but with the exception of one Goodall, they were all killed to within a foot of the ground. Nearly all made a new growth from the stump, and are now from three to five feet high and look healthy, but I do not expect they will amount to anything. Flemish Beauty appears to be the hardiest, the few that I know of have had a fairly regular crop. I would not advise anyone to plant pears. I have a few growing from scions sent me said to be of good size, but think the quality is inferior. The fruit of the Russian that I have is of no use.

Plums have been more of a success. Just let me say that experimenters should be very careful in recommending any particular variety. For several years I said plant Japans. Now I say let them alone. I made a mistake which cost a few men a little money that might have been turned to better advantage. Among the Europeans, Glass has been perfectly hardy. Lombard a close second

with Pond's Seedling and Reine Claude following up. A few years ago I top worked some scions said to be Russians (I have lost their names). These have fruited the last two seasons, the tree healthy and vigorous. The fruit has some resemblance to Glass and is a very fair plum to eat out of hand. I have also a yellow plum found growing wild here on St. Joseph's Island. The tree is an upright grower somewhat like Abundance. The foliage has all the appearance of a European which it may be escaped from cultivation. The fruit has much the appearance of the old Yellow gage, only the skin is slightly tougher. About the same size, but more one-sided, half-cling. Eating good, cooking fair. This plum, whatever it is, is worthy of cultivation outside the best plum sections. It propagates itself from suckers freely and is quite hardy and found growing wild shortly after the first settlers came. The Americanas, some of which are rather late in ripening, show signs of decay. Those planted had been worked on the peace stock, and possibly not planted deep enough. For general planting in the north, this variety should have further trial. They make good preserves. The principal faults are brittle top. Color of the fruit is against it for market. We may look for improvement in this plum. I have found some very good fruit among our native plums but so far have never made a selection from any.

For this locality I would recommend Glass, Lombard, the Americana, budded on plum stock and the Yellow plum mentioned.

Cherries. Situated as I am under the influence of a large body of water, cherries have always been a success. I cannot recollect ever having less than half a crop. If I can keep the tree alive I am sure of a crop of fruit. Bursting of the bark is the principal trouble, otherwise sour cherries may be said to be a sure crop anywhere near the water. They are not so further back. There they have to depend on the old Canadian. Although a sure crop we do not consider them a profitable one. The demand is limited and the cost of picking is more than with other fruits. I cannot improve upon the old selection, viz., Early Richmond, Montmorency, English Morello, to which may be added Oriel 24, Ostheim nearly approaching a sweet cherry when fully ripe is not a profitable one to grow. Montmorency is perhaps the best of the lot and just as hardy as any. Sweet cherries are of no use here. I have only one left and that is covered with snow every winter.

Currants. The crop any year has been quite satisfactory, bushes strong and vigorous and the fruit of fine quality; given plenty of manure, kept clean of weeds, cutting out the old wood and shortening the new meet all requirements. I cannot say among the reds which is the best. The old Red Dutch is posssibly as fine a quality as any. Saunders, Champion and Black Victoria are among the best of the black.

Gooseberries. Were good. There was no mildew among the English berries. We are clean of that here. Golden Prolific has this year again given the heaviest crop and is a satisfactory berry to sell. Red Jacket was nearly as good. Pearl and Downing come next. The only failure was in six plants of Whitesmith grown to one stem and imported from England. They have never amounted to anything. Pearl and Red Jacket I would recommend as the two best all round berries taking quantity and quality into consideration. I like to keep the bush rather open and renew the wood frequently.

Raspberries. Cuthbert was again this year a failure. It is so seldom we get a good crop that they are scarcely worth growing. This is no doubt a fine berry but it is not hardy enough for here. Marlboro for early and Louden are quite sure. Brinkle's Orange, which I have always recommended for private use,

has for the last few years shown so much weakness in the cane and will have to be discarded. It is not advisable to plant this fruit here. The wild fruit is so plentiful and many prefer it for canning.

Grapes. Commercially there is no use growing them as better fruit can be purchased cheaper than we can grow it.

Strawberries. Strawberries have always been by all odds the best paying fruit crop here. The climate seems to suit them exactly. I plant four feet between the rows and eighteen inches in the row. Some varieties might be planted closer, but I do this to facilitate more cultivation. We let all the runners grow, only are careful with the poor plant makers to keep them in the row. Formerly I used to take only one crop and turn them under. Now I prefer to take two crops. By keeping them clean the second will be nearly, if not quite as good as the first. We never cover in the fall, the snow usually is sufficient protection, but put the fine tooth cultivation between the rows in the spring. This I find suits my conditions, but only the fruit may get a little soiled after a rain. Strawberries are being extensively planted in this section. I may state that out of one acre that I had raised to plant from I gave away so many that there was not enough left for my own use. They have all sold for $3 a crate of twenty-four boxes. The cold, wet spring kept them back in the beginning. The first picking, only a few, on the 18th June, and lasted a little over four weeks. I am just as ignorant as ever which is the best berry, but the following have been satisfactory or otherwise with me. Texas was the leading berry this year, and has a long fruiting season, and withstands dry weather well. Haverland easily affected by drouth; with a moist season is a first-class berry, weak fruit stalk. Prolific is too easily affected by drouth; makes plenty of plants, with plenty of moisture; good. Parson Beauty has the same disadvantage as Prolific, otherwise is a more profitable berry and a good plant maker; quality good; some years has done well; Splendid, withstands drouth better; a profitable berry, and makes a good row; one of the best for market. Crescent makes too many plants if left to itself, but a fairly profitable berry. Senator Dunlap, somewhat affected by dry weather, but good; recommended. Bubach stands drouth; a poor plant maker, but one of the most profitable all-round berries. Van Deman discarded. Climax only fair; there are better. Sample a good market berry; strong, healthy plant. Grenville not profitable this year compared with some others; a good plant maker and, under more favorable conditions, a good berry. Clyde, which used to be our best berry, seems to be going back fast; poor foliage; will have to be discarded if it does not turn out better. Millar not so promising as some others. Wm. Belt—there are better berries of the same season. Glen Mary, one of the best berries I have; a strong, healthy grower, dark green leaf. Brandywine, not quite as good as Glen Mary, still good enough to be kept, but is not so good as it used to be. Ion is a magnificent berry every way, possibly the best I have; firm quality; strongly recommended. Corsican—this is a berry with several names; with me the fruit is subject to rot; fruit is large, a good fancy berry; would not recommend extensive planting. There are a few that I have specially experimented on; some not mentioned have been discarded. Altogether our best market here is for a late berry.

APPENDIX "A."

THE GRAPE GROWING INDUSTRY IN THE NIAGARA PENINSULA.

By T. B. Revett, Department of Agriculture, Toronto.

It is almost impossible to get any definite idea of the early days of the grape in the Niagara District. There seems to have been a few men who had planted two or three vines prior to 1860. In that year three plates of grapes were shown at an exhibition of native products held in Hamilton. These were supplied by Mr. Jonathan Pettit and Mr. W. D. Kitchen and a gentleman whose name could not be ascertained. These grapes attracted a great deal of attention, as they were probably the first Ontario-grown grapes ever shown at the exhibition. About 1857 some grapes were planted on a farm belonging to Mr. Porter Adams situated in Niagara Township. In 1858 Mr. W. D. Kitchen and Mr. J. R. Pettit planted some grapes at Grimsby. In 1862 Wm. Read, of Port Dalhousie, planted three acres of Concord, Hartford Prolific and Delaware. In the same year Peter Wright, of Stamford, planted three acres of Isabella grapes. In 1863 Messrs. Lusee, on the mountain near Winona, and J. M. Stewart, Henry Lottridge and Christopher Biggar, below the mountain, all planted small vineyards. In 1868 F. G. Stewart, of Stamford, planted 2½ acres of Concord and Delaware, and P. Prest, of the same place, planted an acre of Delaware, Concord and Hartford Prolific, and in 1869 Walter Kerr, of Drummondville, planted 2 acres of Concord and Delaware, and Mr. Lowin, of St. David's, planted 2 acres of Concord. For the next six or seven years, as far as could be ascertained, very few grapes were planted. About 1880, however, by the introduction of the Niagara grape, a strong stimulus was given to the grape industry. Vines of this variety were sold at $1.25 apiece, and the purchaser had to repay the company out of the first three crops, and was bound to sell all the wood from these vines to the company, and was not allowed to plant a single cutting, under a heavy penalty. In spite of these high prices and binding regulations, the vines yielded a profit of from $2 to $3 per vine for several years.

According to the late Mr. Murray Pettit, who was one of the earliest to grow grapes commercially, and who planted a Concord vineyard in 1872, and who was considered an authority on grapes, there were only about 400 acres of grapes in 1880. In 1890 it had increased to 2,400 acres, with a production of 3,318.27 tons. In 1901 the acreage had increased to 5,750 acres, with the crop valued at $20,000.00. From 1901 to 1909 the planting increased very rapidly, and after careful calculation the approximate acreage of grapes in the Niagara District was found to be in the neighborhood of 10,000 acres. This tremendous increase was not due to any abnormal prices, but to the increase in number of fruit growers, and to the fact that it was found that grapes had proven to be a staple crop. The prices ranged from $20.00 to $22.00 per ton in 1909, as there was a tremendous crop, and as a result very few grapes are being planted this spring.

The Early Marketing of Grapes. It is interesting to note the gradual trend and development of the markets for grapes. Mr. F. G. Stewart, of Homer, told the writer that in the "seventies" he used to ship by boat from old Niagara-on-

Vineyard of J. W. Smith and Sons, Winona, showing good methods of cultivation and trellising.

the Lake to Toronto. Freight, wharfage and harbor dues at that time amounted to 18½c. per basket. These baskets had a capacity of twenty lbs., were made by Indians and sold at from 22c. to 25c. apiece, and used to be returned free from Toronto by the steamship company. Mr. Stewart said that in the "eighties" he netted as high as $210.00 per ton for Delawares and $140.00 to $150.00 a ton for Concords. Mr. E. D. Smith, of Winona, who has been a long time in the business and is perhaps the largest grower and shipper, recalls the time when a few baskets of grapes were enough to supply the market, and it was thought that a few acres would glut the market. In 1872 the express companies started to handle the grapes and the fruit growers began to ship to Toronto and Montreal, and the tendency was to find new markets. After the introduction of the Niagara grapes the price for these grapes was 10c. per lb., or $200.00 per ton. Since that time, as the acreages have been increased and distribution better handled, the consumption of grapes has been increased, yet the price has gradually been falling until it has reached the present low level, which varies from $16.00 to $22.00 per ton.

The gradual development of the markets, the better and more attractive baskets, the general keeping qualities of the grape and the progressiveness of some of the shippers and co-operative associations have all lent themselves to developing the grape industry. In order to get some idea of the magnitude of the grape industry and its wonderful development in the last forty years one has only to consider that grapes are shipped by freight from the Niagara District to Vancouver in the west and Halifax in the east. The St. Catharines Cold Storage Company, which is a co-operative organization of growers in that section, shipped grapes to the West in 1904 under this Department's supervision; in 1905 Mr. R. Thompson, the manager, went West, and as a result of his trip 18 carloads were shipped; in 1906, 30 carloads were shipped West; in 1907, 45 cars; in 1908, 45 cars, none on consignment; in 1909, 90 cars were shipped to the western markets. With the development of the grape industry we also had a development of the wine industry. There are five wineries in the Niagara Peninsula, which used 2,400 tons of grapes in the fall of 1909. There are also three or four factories situated in Toronto, Montreal and Sandwich, which are also supplied with grapes from this district. It has been found that under normal conditions about one-third of the crop of grapes is manufactured into wine. The buying for this purpose has usually been very brisk except during the last two years.

Soils. The grape will thrive on a great variety of soils. In the State of Michigan the soil of the grape sections is a sandy one. In Southern Ontario and Pelee Island the grape soils are mostly sandy. In the Niagara district the grapes are grown on every variety of soil, from a light sandy soil to a very heavy, flat, red clay. In this district, however, the best grapes are grown on the mountain wash soils. This is of a loamy clay. It is a very deep, strong soil, and from year to year is kept fertile by the washing from the mountain. There is a strip of this mountain wash soil from Hamilton to Queenston, and its width varies from 100 to 500 feet. Towards St. David, in the township of Niagara, we find the greatest width of this mountain wash soil, and with its advantage of earliness it must rank as the most ideal location for the growing of early grapes in the peninsula. The best soil for grapes, outside of special locations, etc., is a deep, rich clay or clay loam. When grapes are planted on these heavy soils they ripen their fruit better, and the flavor is much more pronounced and color better developed than grapes grown on sandy soils.

Grapes will also do well on a variety of the lighter soils, but it is hardly

AGAWAM.

VERGENNES.

advisable to devote such lands to grapes, as these lands may be employed to a very much greater profit for production of other crops.

The soils for grapes in the Niagara district may be said to be the clay soils, as they are cheaper and better adapted to the most profitable production of grapes.

Preparation of Soil Previous to Planting. The kind of treatment given to the cropping of land prior to the fall before planting is not very important. The chief factor to be kept in mind is the condition of the land to facilitate planting. A sod is not desirable because, in plowing out the furrows in spring, the result is that the sod is turned up. Grain or hoed crops are perhaps the best to use on land that is to be planted to grapes.

The land should be thoroughly plowed in the fall, and furrowed so as to insure good surface drainage. In the spring this land should be thoroughly worked down with disk and cultivator, and should be gone over twice. While the vines may do well on the land that has not been thoroughly worked, yet the grower should always endeavor to have the soil in the very best shape possible.

Time of Planting. Vines should not be planted until the soil is dry enough to work without puddling. If the vines are planted when the soil is wet, the soil will become caked around the vines from planting, which is very undesirable. Planting may be done from the 1st of May to the 24th. Many of our best growers prefer to be late in planting and have good soil conditions, and they claim that the vines do just as well as early plantings.

Distances Apart in Planting. The distance apart in planting a vineyard, or the amount of feeding space to be allotted to each vine, depends almost wholly on the kind of soil and, to some extent, on the method of pruning. In rich, deep clays—in fact, in all the deep, heavy soils—the space required by vines is much less than in sandy or lighter soils. In light, sandy soils it is recommended to plant your vines 10 feet apart each way, *i.e.,* the rows will be 10 feet apart and the vines 10 feet apart in the rows. This gives adequate room for the development of the vine.

In the heavier type of soils some of the growers recommend the rows to be 10 feet apart and the vines 9 feet apart in the row. This is a good conservative distance, and, for the average fruit grower, is perhaps more adaptable. In instances, however, where a grower has land which by some outstanding feature is peculiarly adapted to the production of grapes, such as would probably be situated at the foot of the mountain, and the grower has made up his mind to give some special attention to this vineyard, it might even be advisable to plant his rows 10 feet apart and have the vines 7 or 8 feet apart in the row. With this close planting it would be possible to get the most out of the vineyard, but at the same time a great deal more attention would have to be given to the pruning.

One of the best grape growers in the Winona section said that he thought it would be a very good plan to set out a vineyard closer and to remove the intermediate vines after a period of five to six years, thereby increasing the yield per acre up to the time of removal, which would considerably lessen the cost of establishing a vineyard.

This method, however, could be practised only where the vines were planted 9 to 10 feet apart in the row and when vines could be purchased at 2½c. apiece, and it is a question whether it would be advisable to recommend it, as the grower would find it very hard to remove the intermediate vines, and if they were left too long a lot of injury might be done to the vines which would eventually form the permanent vineyard.

Kind of Vine to Plant and Its Preparation. Nearly all the fruit growers buy their vines from the nurserymen, and very few, if any, grow their own. The nurserymen gather the wood from the vineyards as soon as they are pruned, and make the cuttings from the good, thrifty wood with sound buds. The base of the cutting is clipped off just below the bud, and the end just an inch or so above the third bud. This gives three buds to a cutting, and the cutting is about one foot long. These cuttings are tied in bundles of from 100 to 300 in a bundle and layered in the soil, standing on end with the buds turned upside down. This is done to stimulate the callousing and formation of roots. In the late spring, when the soil is in good shape, a deep furrow is made, and the cuttings are set in this furrow from three to five inches apart, in rows four to six feet apart. These cuttings are cultivated and kept free of weeds, and make an excellent growth. Those cuttings that have made a strong growth are sold the following spring as No. 1 one-year-old vines. Those vines that are not sold are replanted, and are sold the following year as two-year-olds. There are perhaps some cases where the cuttings are allowed to grow two years and then sold as two-year-olds.

With the above knowledge the grower will be able to decide that the one-year-old vines are the proper ones to plant. This is the consensus of opinion amongst the best vineyardists, for they claim that a two-year-old is nothing but a one-year-old cull that has been replanted. However, there is one factor which has been suggested by one of the growers which would have some influence on the age of vines to be planted. He claims that some varieties are slow growers, and that better results are got from planting two-year-old Worden instead of one.

The usual precautions should be taken in ordering, *i.e.*, the varieties should be given, and you should request that no substitution should be made. The order should be mailed as early as possible, as the nurserymen fill their orders according to the date of receipt of same. The quality of stock required should be plainly stated and the age given. If these precautions are taken there should be no trouble in obtaining your stock. As soon as the vines are received the bundles should be cut open, and the vines heeled in and mounded up to three-quarters of their length. Care should be taken to keep varieties separated, and any simple device will do this. The place in which the vines are heeled should be protected, if possible. When the soil is ready for planting the vines may be trimmed up by cutting back the wood to three buds. There is some diversity of opinion in regard to the cutting back of the roots. Some growers believe in cutting them back two-thirds. This may be done with sharp spade or hatchet when the vines are received in bundles. In this way a lot of time is saved, and the slight difference in the evenness of the roots does not appear to make any difference. One very successful grower told me that he only removed the injured parts of the roots, except in cases where they happened to be over twenty inches in length, and he claims that he could not desire better results. Another grower claims that he cuts back the roots liberally, but he finds that with the system of planting by a furrow the roots take a long time in getting hold of the middle of the row, and that most of the energies seem to be spent in the direction of the furrow. In order to obviate this he cuts two of the roots that are opposite to short spurs from one to three inches long, and in planting these roots should extend towards the centre of the rows or at right angles to the furrow, and he claims by so doing the roots develop in all directions.

Spring Preparation of Land for Planting. As soon as the land is dry enough to work, disk it thoroughly and go over it with a spring tooth cultivator

CAMPBELL.

CONCORD.

and work it down until it is in good shape. It is almost necessary to go over it twice. When the land is in shape and the time has arrived for planting, the marking out has to be done. This is a very simple task, and requires a good plowman and a steady team. The rows are staked out at the proper distances apart at each end of the field, and by the use of two or three rods, depending on length of row, the plowman strikes out a deep furrow of about six inches deep and returns in the same furrow. This plan has been found to be very successful by many growers, and all that is needed in planting. On the other hand, some of the growers prefer to strike out a furrow, and on the return strike out another, leaving a dead furrow between. This is plowed out on the third turn and deepened on the fourth turn. This method is longer, more expensive, but gives a somewhat better condition for planting. It is, however, a question which the grower must decide for himself, and will depend entirely on the amount of time at his disposal.

Planting. As soon as the furrow has been made the planting should be started, and should follow up the plow all the time. A rod cut to the desired length, which is the distance apart of the vines in the rows, is used to show the position of vines. A boy carries a bundle of vines which have been trimmed for planting, and one man does the planting. In planting, the root should be arranged carefully and the earth firmly tramped. The vine should be set so that the two or three buds are just above ground. One cannot be too careful in having the earth firmly packed around the roots, as perhaps more dead vines are due to this defect than anything else.

When a lot of vines are to be planted, two men are used, and a boy supplies them with the vines. By utilizing the second man the work may be more quickly and efficiently done. In some instances another man follows up the planting and fills in the earth to a distance of about eighteen inches on each side of the vine. Some growers have found that by applying a couple of handfuls of bone meal at the time of planting better results were obtained. The bone meal is not thrown on the roots, but is scattered about them before the earth has been completely filled in. When the field has been planted the furrows are filled in by using a disk. The disks are set at such an angle that each section will pass on the side of the row of new planted vines. This is by far the best machine to use, as it pulverizes the soil and fills in the furrow beautifully.

First Year Management of Vineyard.

As soon as vineyard is planted it should be kept cultivated, either with a disk or spring tooth cultivator, and the ground should never be allowed to bake or crust. Cultivation should continue until about the 1st of August, when the vines should be left to mature their wood. In the fall it is well to plow and furrow out the vineyard in order to afford good surface drainage. However, all that appears to be necessary in the way of fall plowing in so young an orchard is two or three furrows on each side of the row. By this I do not mean to imply that the fall plowing of the whole vineyard is not to be recommended. In hilly lands or any lands situated in such a manner that there is a considerable wash in the spring, I think it would be greatly advisable to abandon the plowing of the whole vineyard and only plow two or three furrows up to the vines, whether the vineyard be young or old.

There is one vineyard I know of which is situated at the foot of the escarpment, and the water runs straight down the rows. In this vineyard the above practice is, and has been, followed for several years with excellent results.

Mulching of Young Vineyards. Mulching of young vineyards is practised by a great many growers, and seems to be a commendable practice, because, besides manuring the vines, it acts as a protection and mulch. Good, strawy manure is used, and two forkfuls are generally applied to each vine.

Cropping of One-Year-Old Vineyard. The question that naturally arises is, will a systematic cropping injure a young vineyard? It seems almost obvious that the plants do not require the whole of the feeding surface for their development during the first year, yet nearly every grower seems very sceptical on this point and almost invariably ends by giving his opinion, which is not very favorable to cropping, and his ideas must have been formed either by personal experience or observation. However, it stands to reason that if the land is needed it will in no way injure the grapes if the vineyard is cropped, but a distance of three feet should be left on each side of the row, and only those crops which will not shade the vines and are hoed crops should be used. I would not recommend the use of corn, as it does not permit free circulation and shades the vines too much. Tomatoes, potatoes and roots are probably the best to be used in cropping a young vineyard. I have always observed that the great drawback to inter-cropping was the lack of appreciation by the grower of the fact that if he inter-crops he must also fertilize and endeavor to carry on such a rotation that will improve rather than deteriorate the soil. If this factor were more faithfully observed there would not be so many discouraging opinions with regard to inter-cropping.

Spraying. It is not usually found to be necessary to spray a one-year-old vineyard, but should any insect attack it, poisoned Bordeaux mixture should be used. It is very little trouble to spray such a vineyard, and the expense is almost infinitesimal, and it would be a good precaution to spray the young vines after they had made their first growth.

Rubbing off of Buds. Two buds were left in the first instance, in order to insure a sprout, and in case one sprout was destroyed there would be another to take its place. As soon, however, as the growth has attained a length of from 10 to 15 inches, select the best shoot and remove all others. This will strengthen the growth.

Pruning.

Second Year Management. The method of cutting back in the second year varies greatly. Many growers desire to maintain their first year's straighter growth. However, taking all things into consideration, I would advise following out the method of cutting back to the second bud. By doing this the growth is greatly stimulated, and, as a general rule, the wood that is formed is of a strong, healthy texture.

Cultivation. As soon as the ground is dry enough it should be plowed about three inches deep. In many cases it may be noticed that some plowmen, while doing this work, will hold their plow at an angle. This is a very bad practice, because the work done is very uneven. The heel of the plow is up and the point down. This makes the furrow to a small degree V shaped—one part of the furrow being deeper than the other. The plow should be held squarely and an even furrow plowed, and your work will be more thorough and uniform. A gang plow is the best for this work. It does the work more evenly and with greater rapidity. After plowing it will be necessary to use the grape hoe, in order to get as near as possible to the trunk of the vine. While the young vines have not yet taken full hold of the ground allotted to them it is not wise to plow very deeply.

MOORE.

WORDEN.

and thereby cut the surface roots. This is especially so in well-established vineyards, as in these the roots have extended very far and should not be ruthlessly destroyed by deep plowing. After the vineyard has been plowed it should be disked and cultivated, and the cultivation should be kept up until the 1st of August, and in the fall it should be plowed as in a one-year vineyard.

Cropping. While it may prove successful if a proper method of cropping was carried on the first year, I think it is highly undesirable to crop during the second year, as I believe that full attention and every advantage should be given the vineyard from now on.

Mulching. The system spoken of in the first year's management is a good one to follow and is giving good results.

Ends of grape trellis showing method of bracing posts.

Trellising. The work of putting in your posts and starting the trellis should be started.

Posts. Good cedar posts should be used. For the end post the post should be longer than others and not less than five inches in diameter, while the intermediate posts should be about three inches up. The posts should be well cured and not dead. If your posts are good they should last at least twenty years. If the butts of the posts are painted with tar they will keep very much better. The posts should be set about thirty feet apart and from 2 ft. 9 in. to 3 ft. in the ground.

Setting End Posts. The end posts have to be set more firmly, as they have to bear a greater strain. There are several methods of setting and guying the end posts. The usual method is to make the post hole deeper and larger, and to nail a cross bar on butt of post. This is done to keep post from heaving. Some heavy stones, if handy, are advantageously used as the first filling. Care must be taken

that the filling is well rammed. The post is then guyed with strong wire (galvanized). The wire is secured to the post about a foot from the top; the other end is attached to a large stone, which is buried about three feet deep and as near to the post as possible without decreasing the relative ratio of the purchase. This distance is about four to five feet. The wire is tightened by using a stick and twisting the wire. The greatest objection to this method of guying the end post is the waste that is occasioned. The wire interferes with cultivation, wastes a lot of land and is conducive to slovenliness. However, this method is the best method of guying or giving the necessary strength to the end post by use of an outside support. Many of the new vineyards have been guyed on this principle, only the wires have been attached from the top of the end post to the base of the first post. In some cases a wooden brace between the end and first post is used, and is very effective.

Another method of setting an end post which has been strongly recommended by one of our best growers, and which appears to be evidently acceptable as it does away with the guying, is "setting the post in cement," and is done in the following way: A large hole is dug, the bottom of which is made very much larger than the top, and the ratio of increase of diameter of hole increases very rapidly at the bottom. This is done with the idea that if the soil is not disturbed the rigidity is greater, and by shaping out the bottom the cement foundation will be more rigid. In preparing the post for setting a cleft is cut on each side, in order to give the cement some hold on the post. It may even be beneficial to attach a cross bar to the bottom of the post. The post is then set in position, and the cement is filled in and well rammed, in order that it will thoroughly fill the hole. The filling is continued until you have a cement foundation about a foot thick. The cement is left exposed for a few hours, and then the hole is filled in usual method. This method of setting in cement is more expensive, but the headrow of the vineyard is easily kept clean, as there are no wires in the way, and again we invariably have the rusting and breaking of guy wires, which are tedious and expensive to replace.

Wire and Wiring. It is a good plan to get the best grade of galvanized grape wire. No. 9 staple wire is the usual size in use.

Wiring: It may not be necessary to put on all the wires that are necessary for the system of training that is to be followed, but a job that is half done is unsightly and detracts from the appearance of the young vineyard, and is likely to give a bad impression to casual observers, and if it is at all possible to complete the wiring it is strongly advisable to do so.

The wiring of the posts is a very simple thing. In wiring of end post one of the many plans for tightening the wires has to be followed. There are some simple devices which are attached to the post, and the wire is tightened by turning a crank. A very simple method in use is a piece of hardwood about an inch square and six to eight inches long. The wire passes through a hole in the post and is attached to the stick, and to tighten the stick is just turned round, and the tautness of the wire, together with the shape of the "tightener," keeps it in place. In stretching the wire the spool is placed on a spindle at one end, and a man takes the wire to the other, where it is tightened and fixed in the same method as the first post. The wire is then fastened to the post by staple.

Distance Apart of Wires. The distance apart of wires depends entirely upon the system of pruning. When only two wires are required, the first wire should be 2½ ft. from the ground, and the second or top wire 2½ ft. from the first. Where three wires are used the first wire is generally 18 inches to 2 ft. from the ground, and the top wire 5 ft. from the ground, while the third wire is

halfway between. In cases where four wires are used, the first wire is from 15 to 18 inches, and the other wires evenly spaced off, the top wire being 5 ft. from the ground.

Training of Two-Year-Old Vines. In many cases the training of these vines is neglected; but this is very wrong, as it is desirable to obtain as straight a trunk to the vine as possible, and this can only be done by training during the second season. The chief training to be done is that of the main shoot, which should be tied up to second wire as soon as its growth permits.

Summer Pruning of Vines. The only summer pruning to be done in a two-year vineyard is to rub off all the buds or shoots from the main stalk from the ground up twelve or fifteen inches of the trunk. This is done to strengthen the trunk and keep it clean and even.

Management of a Three-Year-Old Vineyard.

In the third year a vineyard commences to bear and the general routine of work is practically the same as all other years, the cultivation, which consists of fall and spring plowing, and a thorough harrowing of the soil. The use of the grape hoe becomes more necessary, and some of the growers attach a small one-horse cultivator to the grape hoe, the cultivator taking the place of the shear of the grape hoe. This makes a very handy tool for working up to the vines. In the fall the soil is plowed up to the vines and in spring away from them. It, however, cannot be too fervently expressed that proper and frequent cultivation must be given the vineyard in order to get the best results, and the cultivation must stop about the latter part of July in order to induce the vines to ripen their fruit and mature their wood. The most important thing in the third year of a vineyard, and perhaps of all the preceding years, is the pruning and training and this feature will be taken up after the discussion on the different methods of training grapes as the pruning closely hinges on the methods adopted.

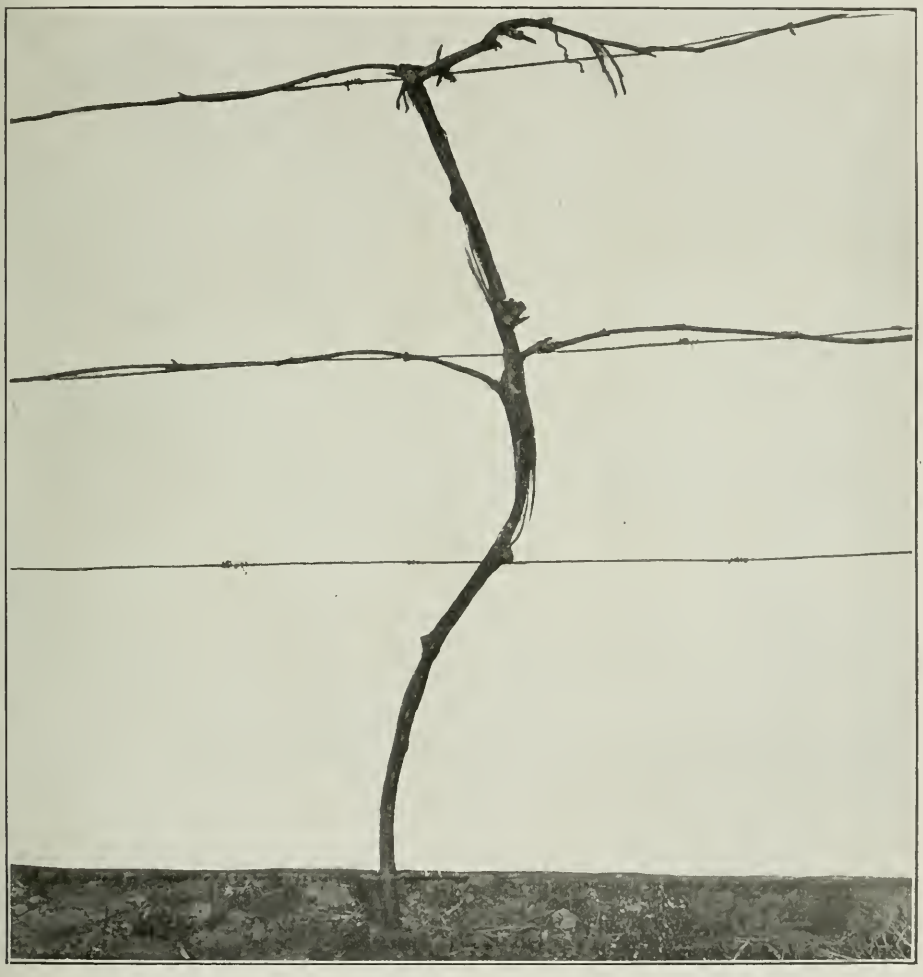
Method of Training Grapes. There are six methods of training and trellising grapes to be found in the Niagara Peninsula. They are as follows:—

1. The Kniffen system.
2. The Arm system.
3. The Fan system.
4. The High renewal system.
5. The Arbor system.
6. The conglomerate and do as you please system.

The Kniffen System. This system of training grapes is perhaps the most common, especially in the neighborhood of St. Catharines and towards St. Davids and Queenston. It consists of a central cane with four arms and is trained on two wires. This system is greatly recommended by some of the best growers, especially in cold sections and on sandy or light soils. Its chief advantage is that it permits of thorough ventilation. It is generally cut back to seven buds to each arm and four arms to a vine which gives fewer bunches than other systems, but these fill out and ripen better, and there is not as much tying up. The Kniffen system is admirably adapted to the production of market grapes of the best quality but the yield of bunches is not as great as in the other systems.

In pruning for the first and second year the vines are cut back to two or three buds as previously described. In the third year one arm is trained along

the first wire, and if possible a second arm is trained on the same wire. The second arm is generally from the first. The probability of securing a second arm may be increased by leaving a spur at the proper point during the second year pruning. The main shoot is carried up to the second wire. The grower should endeavor not to crop his vineyard too heavily, and from twelve to fifteen buds are quite sufficient to be left, the others should be rubbed off. With this system there is virtually one central trunk with a side arm at the first vine from which



Old Kniffen System.

the two arms are eventually taken. It is claimed that in this way the flow of sap is straight to the top of the wire while the canes on the first wire do not get as much nourishment and they do not as a general rule give the best possible results. This argument may be substantiated if the size of the trunk is any criterion by which one may judge the ratio of the flow of sap, because it is invariably noticed that the size of the trunk from the first wire to the top of vines is a great deal larger.

In order to ameliorate or equalize conditions, Mr. F. G. Stewart, of Homer,

devised the plan of dividing the main trunk below the first wire, carrying one trunk to the first wire and continuing the other up to the top wire, and he claims he has accomplished the act of more evenly distributing the flow of sap over the whole bearing surface of the vine. The division is got by allowing two canes to grow at about fifteen inches from the ground. In the fourth year the vine should have conformed itself to the Kniffen system, and in pruning in the spring there should be two arms on each of the wires and seven buds should be left to each arm. The Kniffen system is a very desirable form for training grapes and is highly recommended by a great many growers.

The Arm System. This system is best adapted to the production of a quantity of grapes and is used more for wine production, but in Ontario there is no specialization of growing grapes for wine, and the growers only adopt this

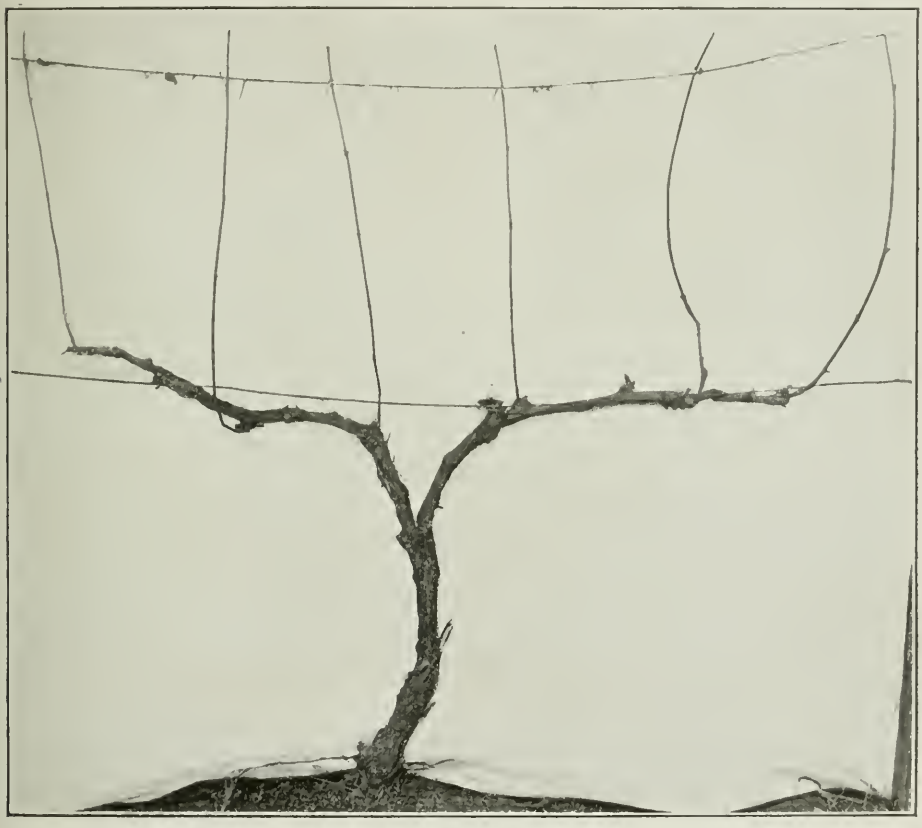
Improved Kniffen System, showing the method of dividing trunk of vine.

system because it appeals to them. It consists in having two main trunks along the first wire, and from each of these trunks five canes with from seven to eight buds are left. These canes are tied up to the wires at almost right angles to the arm. Three wires are used, the top wire being about five feet from the ground and the middle wire evenly spaced. In the second year the vine is trained in two arms along the first wire and in the third year it is cut back two or three buds to the arm, and the fourth year four or five canes are left which are cut back to five or six buds.

Fan System. This system is admirably adapted for the production of a quantity of grapes. It is easily pruned and gives an even distribution of wood, and next to the Kniffen system is more generally used in the district than any other. It is not advisable, however, to adopt any system which has the tendency to induce over bearing, especially in late ripening varieties, as this might result disastrously in cases of early frosts. Besides, when over-production is prevalent

we have an improper ripening of wood, and as a result, winter killing of the canes. This system is very prevalent between Hamilton and Grimsby, especially in the Winona District.

High Renewal System. This system seems to be a moderated type of Fan and Arm systems. Its chief value is the evenness of distribution of wood, the apparent simplicity in pruning and the excellent results it has given around Winona, especially on the mountain wash lands. It is used by Mr. E. M. Smith, who recommends it very highly. In the first year the vine is pruned to two buds. After they have grown about ten inches break off one cane. The second



Arm System.

year cut back to two buds again (if vine is weak only save one cane); train to first wire. Third year train to first wire and tie vine so that it is taut (vine should be twenty to twenty-four inches from ground). Rub off all buds below one foot from ground. Fourth year run out two canes along first wire and centre cane to second wire and cut off all canes to six or eight buds.

Arbor System. In this system the vine is cut back in the first and second year to two or three buds, one shoot being retained each year. In the third year the vine is run up to the top of arbor, which is built about five to six feet high. The vine is then trained along the top of arbor, and every year the wood is renewed and about thirty buds left to bear. Outside of home vineyards, which are trained in this manner in order to lend an appearance of beauty to the garden,

there is only one commercial vineyard trained in this manner and the grapes are grown for wine. This vineyard is situated at St. Catharines and is the property of one of the large wine-making companies.

The Conglomerate and do as you Please System. This system, I am sorry to say, appears quite frequently in the Niagara District and the adjacent country where grapes are grown. It may or may not be the result of carelessness, but the chief cause is the lack of definite knowledge of the methods of training, and also the employment of trimmers that are not conversant with any definite methods or reason for methods which they may practise, the chief idea

Fan System.

being to remove a portion of last year's growth. In these cases we invariably find that too much bearing wood is left on the vine and the net result from such conditions is that the vineyard presents an uncared for appearance, the fruit is much harder to pick and the bearing wood recedes further each year from the main trunk. There is no special method of training these vines, as this system is liable to be found on any kind of trellis.

Pruning. Pruning is one of the most important factors in successful grape growing. On it depends the even distribution of wood, the limitation of the crops, the quality of fruit, the development of bunches and the ripening of same and the general appearance of vineyard. The majority of growers understand the importance of pruning. They realize that wood must be renewed but have not arrived at some specific ideal of training, which goes hand in hand with

pruning. Too often men are hired to prune the vineyard, and probably a different man every year, with the result that the best results are not achieved, and in many cases the shape of vines destroyed. No definite plans can be laid down for pruning, and several things have to be taken into consideration which are local and call for personal observation and experience. The ultimate object of pruning is to produce the best fruit, to keep the vines in a desired shape, to control the factor of bearing and to facilitate all necessary operations in the production and harvesting of fruit. The vineyardist must bear in mind that it is within his control to limit the number of bunches to be produced by any vine in his vineyard. With this factor under his control he should use his judgment in pruning. He must study his varieties and their methods of bearing and ripening. For instance those varieties that are late in ripening should not be allowed to bear too heavily for this is conducive to late ripening, and very often we find late ripening and productiveness hand in hand. The amount of fruit which a vine can bring to maturity with the best results depends upon the fertility of the soil. This is another factor which receives too little attention by the growers of the Niagara District, and it too often happens that because somebody, who may have entirely different soil both in regard to physical character and fertility, leaves so much bearing wood on his vines it must be right for somebody else to do the same. The only way to determine the amount of bearing wood to be left on your vine is by observing the crops and their quality. A vine that is young and inclined to be small and lacking vigor will not improve by over-bearing and should be cut back more severely. It must be borne in mind that the proper number of bunches to a vine should be just what the plant will be able to fill out properly and mature. It is better to have fewer bunches and better ones. It is a general plan to allow from twenty-eight to thirty buds to a well grown vigorous vine. One factor which must bear strongly on the number of buds to the vine is the distance. Vines that are planted closely should not be allowed so many, but the aggregate production to the acre will be more. The fundamental principle of pruning grapes is based upon the following fact that the fruit is borne in a few clusters near the base of the growing shoots of the season which spring from wood of last year's growth. The number of bunches that are borne on these growing shoots vary from two to five, according to the variety. This feature will be taken up in the discussion of varieties.

The feature next to the importance of the proper proportion of bearing wood to the vigor of the vine is securing the desirable growth for the following year and to obtain this growth in position desired. All successful vineyardists endeavor to have the bearing wood spring from as near the centre part of the vine as possible. In order to get this it is customary to leave a spur with two or three buds in the desired position, and the growth resulting from this is the bearing wood for next year. Sometimes it is not possible to do this and on the other hand shoots may start from the stem of the vine which may be more adaptable than those from the spurs.

The Kind of Cane to Select for Bearing Wood. It is not an uncommon thing to have extremely well developed canes which appear plump and most desirable. It will be noticed, however, that the joints of these canes are abnormally long and the buds are wedge-shaped instead of being round and plump. The best growers avoid the selection of these canes, which they call "Bull canes," and claim that they do not produce as good bunches. One grower, however, informed me that he tried an experiment with some of these bull canes and could find no difference in the productiveness and quality of fruit. It would

be advisable, however, to retain those canes which are characteristic to the variety and well developed and have round plump buds.

Time of Pruning. In the Niagara District it does not seem to matter at what time during the dormant season that grapes are pruned. It has come to be an established fact that pruning of vineyards may be started in January and finished by March. It is best to have the same man do your pruning from year to year, and if more than one man is employed some responsible party is generally placed in charge of the work. After the vine has been pruned the trellises are cleared by cheap labor. Trimmings are thrown in the centre of the row and are gathered in the spring and burnt.

In gathering the trimmings a pole from 12 to 16 feet in length and 2½ to 3 inches in diameter at one end and slightly smaller at the other end is used. It is best to have the largest end, which is the one that draws along the ground, slightly curved at the end. A horse is used to drag the pole and the whippletree is attached by means of a chain or rope to a point about four or five feet from the ground end of the pole. The driver holds one end of the pole and proceeds down the row. The pole soon collects the trimmings, which are heaped at the end of the rows and burned. Some of the growers use a spring tooth cultivator for this work with a great deal of success.

Summer Pruning. Summer pruning is not recommended as a general thing. Some of the growers shear back the vigorous growth if it is shading the fruit too much. In some varieties, such as Champion and Vergennes, sprouts will very often appear and fruit many small ill-shaped bunches. These should be removed. It is also a good practice to remove any vigorous growth which may sprout up from below the first wire. However, if one is about to renew his vine it is well to select one of these shoots sprouting from the collar of the vine and train it.

Pruning Tools. The ordinary clippers is all that is required for winter pruning. Unnecessary growths in early summer are best rubbed off with the hand, and the pruning back of vigorous growth is usually done with a large pair of hand shears.

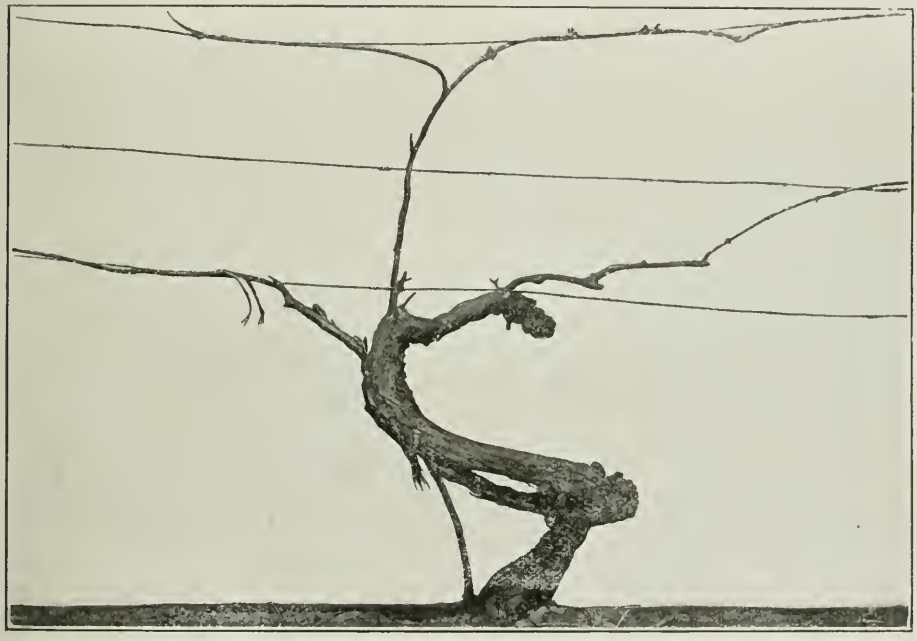
Renewing Old Vineyard.

A system of renewing is sometimes adopted in vineyards that are very old or in vineyards that have been disfigured by improper pruning. In order to renew a vine a shoot coming from the ground is protected and in pruning the first year it is cut back to the first wire. The second year it is pruned according to the system of training, and part of the old vine is removed. In the third year the pruning is carried out as the second year but your wood on this new vine would probably enable you to train it on the upper wires. This year some more or the whole of the old vine is removed according to the vigor of its successor. This plan is very good because no crop is lost in the renewing of the vine, and when the old vine is discarded the new one is in full bearing. It is sometimes hard to get a new shoot from the ground, and while the majority of growers wait for their opportunity to secure a sprout one of the growers claims that he gets good results by ringing half way around the base of the old cane. This ringing causes the formation of sprouts, from which one is selected.

Tying. In the spring the vines are tied up with strong grape twine. A woman will do this work very handily. The twine should be wrapped twice to three times around the wire, make one knot and then tie up cane. This method of tying does not cause slipping and allows room for expansion of cane.

Fertilization. To get the best results from a vineyard the soil must be fertile. In rich wash soil situated at the foot of the mountain the grapes do well with practically no manure or fertilizer. This is evidently due to the fact that a good deal of fertility is washed off the mountain on to these lands every spring. The majority of the heavy clay soils and the loamy soils need manure, especially the clay soils, the physical texture of which is far from being ideal, and good applications of barnyard manure would be very beneficial.

Within the last two years a great many of the growers are applying barnyard manure. They, however, make the great mistake of applying it around the trunk of vine instead of spreading it over the row where the feeding roots can get at it. While a good application of barnyard manure will give excellent results, it must be remembered that it contains more of nitrogen than of the other constituents



Method of renewing old vineyard, showing a two-year-old cane which will take place of old trunk at next pruning.

of plant food and too heavy and frequent applications would be apt to stimulate too much growth. An application of from six to nine tons per acre every three years should give good results.

Commercial Fertilizer. The use of commercial fertilizer is becoming more common amongst the fruit growers. Many of them claim that by its moderate use good results are obtained providing the soil is in good physical condition, especially on the lighter soils. Mr. F. G. Stewart, of Homer, recommends the following application: Rock phosphate 400 to 500 lbs., potash 100 per acre sown broadcast. In buying fertilizer the grower should never buy a mixed compound but should buy the ingredients and mix it himself, and in doing this he saves money and knows exactly what he gets. There is no definite rule in regard to the amount and kind of fertilizer to use. This depends entirely on the soil and its condition. The grower, therefore, should experiment for him-

self and he will be able to know definitely what is needed and the quantities that will give him the best possible results on a minimum expenditure.

Cover Crops. The use of cover crops is primarily to incorporate vegetable matter in the soil, and when nitrogenous crops are used they also incorporate nitrogen in the soil. The secondary function of the cover crops is to hold the snow. The greatest drawback in a cover crop is that it makes it very wet picking the fruit. Nitrogenous cover crops are not often used in vineyards. The chief crops used are rye, oats and barley. These are sown early in the summer and plowed under early in the fall to facilitate picking. In some cases rye is sown in the fall at the rate of one to one and a half bushels to the acre and plowed under in the following spring just when the grain starts to head.

Harvesting.

Never pick your grapes until they are ripe. During the past years there were growers who have been extremely eager to obtain the highest market price for their grapes and to do this they pick their grapes without the slightest regard for the ripeness. Their whole endeavor is set on getting to the market with grapes before anyone else, and incidentally to palm off on the unsuspecting public an article not fit for hog feed, much less human consumption. If there were only individual cases of this fraud being practised it would not be so bad, but the neighbors see the grapes going to market and the temptation seems to be almost irresistible and we find growers all over shipping green grapes. Ask them their reason and they will reply that the other man is doing it and getting the high prices. What is the result of this marketing of green grapes, and who does it affect? The answer to the first question is very apparent. The consumer gets the green grapes and decides that either they are green and unfit to eat and that he has been cheated or that he has lost his taste for grapes, and what is the result? A falling off in consumption. The good prices that are obtained on an early market do not last long and the growers suffer. This regrettable feature should be eliminated and the growers should do everything in their power to stop themselves and their neighbors from selling green grapes. Grapes do not require to be picked before they are ripe in order that they carry well. On the other hand they carry better and keep longer when they are picked ripe.

The question may then be asked, when is a grape ripe? A grape may be said to be ripe when it has received its full development of color and flavor.

Picking of Grapes. The picking of grapes is mostly done by women. The grapes are picked directly from the vine and put in the baskets, which are placed when full on the shady side of the vine to be picked up later by the wagon. The bunches should be handled as carefully and as little as possible, in order not to rub off any of the bloom. The bunches are severed from the vines by means of grape plyers. This little instrument is very much like a pair of scissors, but the blades are very small. A knife should not be used as it necessitates holding the bunch more firmly and the act of cutting the stem with a knife requires a forward pull which tends to bruise the bunch. The stem of the bunch should be cut short, about an inch to one inch and a quarter. Any dried or green berries must be picked out with the fingers. The bunches are then placed in the baskets so that they are not loose. Those bunches forming the top layer of the basket are placed stem downward which gives the basket an attractive and finished appearance. The baskets are usually covered in the field and taken to the packing shed

where they are hooked. The baskets used are either six or eight quart baskets and cost about $34 per thousand. There are several other packages which are more or less fancy and could be used to advantage for high class trade, such as the crate which holds four three-quart baskets. These make a very attractive package, but the market for such packages is very limited at the present time, though there is no doubt that it may be worked up.

Markets.

The markets for the grapes of the Niagara District include the whole Dominion of Canada. Our grapes are being sold from Vancouver to Halifax. The great drawback seems to be improper distribution and underselling. Like every other commodity the grapes have to be sold at a certain price in order to be profitable to the grower. It is the last crop the grower has to market, and the fruit comes in in great quantities and very rapidly, especially towards the end of the season. The result is that distribution has to be very perfect in order to market the crop without glutting any one market. The present state of marketing is far from perfect. There are six co-operative societies, three large buyers and many small buyers shipping independently, and the result is an unsteady market. The grapes have to be disposed of quickly in order to move the crop, and the buyers must sell at an advance of 1½ cents per basket in order to make a small margin. In the face of daily increase of grapes the buyers and associations have to find a market. For instance last year's crop was marketed to the great dissatisfaction of the grower and in several cases to the loss of the buyer. The grape crop was a very heavy one. The wine manufacturers only bought about one-third of their usual purchase, and in spite of the fact that green grapes had been sold in large quantities which discouraged the early markets, the consumers were taking a tremendous quantity of grapes. The price was falling rapidly and many of the growers had to be satisfied with 10c. per basket while the average price was not above 12½c. per basket. Several reasons were given for this demoralizing state of affairs. The great cry was that the French Treaty had caused the wine manufacturers to curtail their purchases almost to one-third, and that there was an over-production of grapes. These factors no doubt played a very important part in producing the crisis, and the effect will tend to stop the planting of grapes to a very great extent. Some growers justly claimed that the promiscuous selling of green grapes lowered the average price to a great extent and they were unquestionably right. However, these causes do not seem to answer sufficiently for the prices of grapes. The markets did not seem to be glutted in any case, and the consumer had to pay the usual price per basket even in Toronto. While the grapes were being bought at from 10 to 12½c. per basket from the grower the consumer in Toronto was paying from 18 to 28c. for the same article, and yet we know that the buyers in the fruit district lost on their grapes. There seems only one explanation, namely, that the buyers have been underquoting their competitors even below the margin of cost, and that this system was greatly intensified in view of the large crop and the rapidity with which it ripened. To the average onlooker who had no knowledge of the industry a simple remedy would be to amalgamate the interests or to have some working basis on which prices should be based. The first suggestion has received a great deal of thought, but would be an extremely hard plan to consummate. In this market there are individual buyers and co-operative associations consisting of the growers themselves, while the buyer buys

the grower's produce and expects to make his profits, and it would hardly be acceptable to the buyer to have such close relations with the farmers through their associations. If such a proposition could be established it would greatly ameliorate the conditions of the grape market and would be the greatest boom to co-operation that Ontario has ever seen or even dreamed of and would mean a tremendous increase in the membership of the co-operative associations. To the average public such an organization would be greeted with a great deal of awe and disfavor and the cry would immediately arise that a monopoly existed and the price of grapes would immediately be raised and maintained. This, however, would not be the case. Grapes are perishable and have to be consumed within a short period, and the consumption decreases rapidly with the advent of cold weather. The main object of this amalgamation would be to fix a uniform price for grapes, starting from the early varieties down to the end of the season. Such an amalgamation would mean that the distribution would be more even, the grapes would be better packed and handled and the green grape nuisance would be more conveniently held in check.

The second suggestion, that the associations and buyers should get together and fix a ratio of prices which would be rigorously adhered to seems to be a very admirable one at first thought. This has been tried with the result that the quotations were not adhered to and a merciless cutting of prices was instituted and the growers had to foot the bill, especially those who had not contracted their grapes beforehand.

The different parties who are interested in definitely doing away with the present unstable and unprofitable state of the grape industry have had several meetings already with but little result, but it is hoped that some definite plan will be formulated and upheld during the coming year.

Contracting Grapes. A large percentage of the grape growers contract their whole crop of grapes either to the buyer or wine manufacturer. The contracting is resorted to in order to insure a certain percentage of grapes before the market opens. The buyers usually contract at so much per basket for the different varieties or buy the whole vineyard at a flat rate per basket.

The wine manufacturers buy at so much per ton f.o.b. Grapes are picked and put in barrels, all fruit being taken. The different colored grapes are kept separate. In selling to the wine manufacturer the grower has very little trouble in the harvesting and shipping of his crop.

Cost of Production of One Acre of Grapes.

As a sequent to the prices realized by the growers last year great interest has been shown in regard to the actual cost of production. Mr. Murray Pettit, who is one of our largest grape growers, and is considered an eminent authority on grapes, not only in Canada but also in the States, gave an address at the Convention of the Fruit Growers' Association in November, on the cost of producing and maintaining an acre of grapes and also endeavored to prove that grapes were an unprofitable crop at 12c. per basket, and while there was some diversity of opinion with regard to his figures on the actual cost of production yet the consensus of opinion throughout the whole district is that the margin of profit at that price is too small to cover risks of hail or frost or variability of crop, and they all agree that the prices should be from 14 to 18c. per basket according to variety.

It must be taken into consideration in computing the cost of producing and maintaining an acre of vineyard that there are two years in which the vineyard does not yield any crop. It is true that a crop may be grown the first year, but the percentage of land that may be utilized is small. The three crops used are corn, potatoes or tomatoes, but corn is not very highly recommended as it shades the vines. Potatoes and corn do not give the very best results on the majority of grape soils. The cost of grape land varies very much but the average would be about $125 per acre.

Land	$125 00	
Fall preparation of land	3 00	
Spring cultivating and marking furrows	1 50	
Cost of 435 Vines at 4c.	17 40	
Planting	3 00	
Cultivating	3 00	
Fall plowing	2 00	
Interest on money invested at 5% (practically)	7 50	
Allowance for cropping		10 00
Total expenditure for first year	$162 40	10 00
Net expenditure for first year	152 40	

Second year.

Working soil in spring	1 50	
Cultivating	3 00	
Pruning and tying	1 00	
Interest on capital at 5%	7 50	
Cost of trellising		
435 Posts at 15c. per post	65 25	
Planting 435 posts (including digging and setting posts) at 5c. per post	21 75	
Staples and Wire	10 00	
Wiring	2 00	
Interest	13 00	
Total	$125 00	

Third year.

Pruning	1 50	
Tying	50	
Cultivating and plowing	5 50	
Fertilizing	8 00	
Spraying twice	1 00	
Interest	14 70	
	$31 20	
Average crop for third year, 435 baskets per acre.		
435 Baskets at 12c.		52 20
Cost of 435 baskets at $34 per thousand	14 79	
Picking 435 at ¾c. per basket	3 26	
Covering	1 00	
Delivery	75	
	19 80	
Total expenditure for third year	51 00	
Total revenue		52 20
Net revenue		1 20

Total expenditure for first three years—above receipts:

First year	152 40	
Second year	125 00	
Third year	8 50	
Third year	1 20	
Management for 3 years at 5%	16 92	
		$293 12

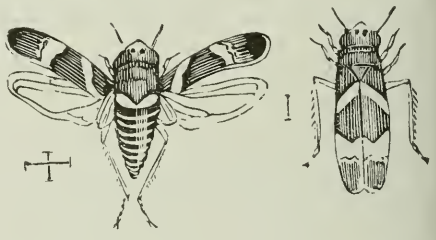
Fourth Year.

Pruning	$3 00	
Tying	2 25	
Gathering and burning bush	50	
Spraying	1 40	
Plowing and cultivating	5 50	
Fertilizing	8 00	
Interest	15 73	
850 Baskets at 12c.		$102 00
Cost of 850 baskets at $34 per thousand	28 90	
Picking 850 at ¾c. per basket	6 37	
Covering	2 00	
Delivering	1 00	
	74 65	
Management	5 00	
	$79 65	102 00
Profit	22 35	

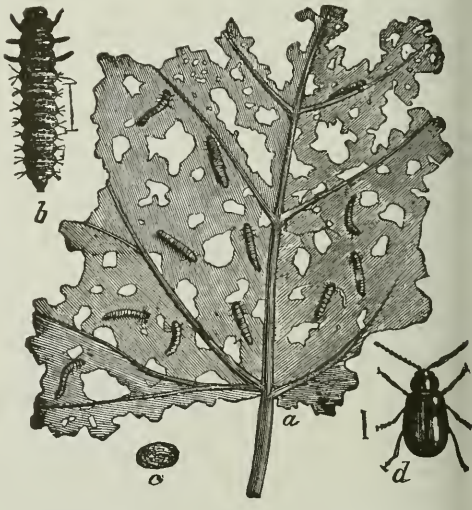
Insects and Diseases.

The grape is perhaps freer from the devastation of insects and diseases than any other fruit grown in the Niagara district, and it is perhaps owing to this

Grape-vine Flea Beetle (Haltica chalybea).



Grape-vine Leaf-hopper (Erythroneura vitis).

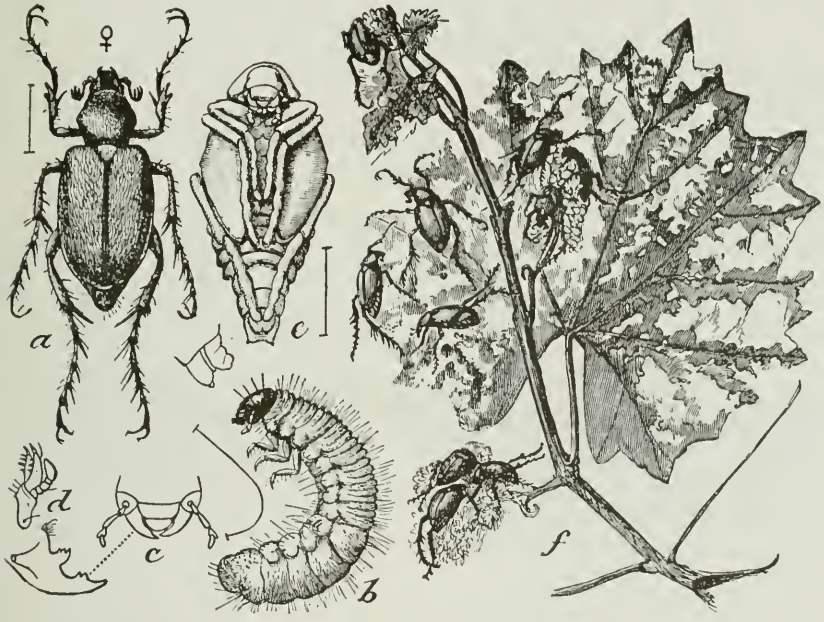


Grape-vine Flea Beetle (Haltica chalybea); *a*, Larvæ feeding; *b*, Larva; *c*, Pupa stage; *d*, Beetle.

factor, together with the almost assured prospect of the production of an average crop every year that the grape has been placed in the same relation to the fruit industry as grain may be said to hold in regard to general farming—namely, the staple crop.

While a good collection of insects may be gathered by a visit to all the vineyards in the Peninsula, yet I have not been able to locate any special insect which may be said to be the cause of any serious damage to the grape industry.

The Grape Vine Flea Beetle, *Haltica chalybea*.—This is a little, shiny steel blue beetle about one-sixth of an inch long and appears during the early period of growth, and while it does not do any considerable injury in the Peninsula it is perhaps the most prevalent but is easily controlled with poisoned Bordeaux. This insect winters over under rubbish or near the roots of stumps of



Rose Chafer (Macrodactylus subspinosus): *a*, beetle; *b*, larva; *c* and *d*, mouth parts of same; *e*, pupa; *f*, injury to leaves and blossoms with beetles, natural size, at work (after Marlatt, U. S. Dept. Agriculture).

trees. The grower should always keep it under control as it is capable of doing a considerable amount of damage.

The Rose Chaffer, *Macrodactylus subspinosus*.—This insect is a dull yellowish brown color, half an inch long, with long spiny legs. It is a very voracious feeder and will completely strip a vine or rose bush. It is not very common and seems to appear locally. I remember one case where this insect appeared on a farm near Burlington and did considerable damage to some of the vines. It is not easily controlled, as the poisons, especially Paris green, do not seem to have any great effect on it. As soon as these insects appear they should be hand-picked and destroyed.

The Spotted Pelidnota, *Pelidnota punctata*.—This is a large brown beetle something like the June Beetle, but has three black spots on each wing cover. It appears during July and eats the foliage. It succumbs to the poison, but is so conspicuous that it is easily detected and should be killed when seen. This insect is quite prevalent but does not do any serious damage.

The Grape Vine Sphinx. According to Mr. T. D. Jarvis there are five species of the insect to be found in the vineyards, the commonest being the Green Grapevine Sphinx. When the caterpillars are full grown they are about two inches long and are very noticeable. They are found occasionally in almost all the vineyards and may be hand-picked. The adult is a beautiful large moth, the fore wings expand about two and one-half inches, of a velvety green color with dark bands. The hind wings are smaller and of a dusty red color.

There are several other caterpillars that appear in the vineyards, but have not been the cause of any serious loss. The following is a list of some: Grapevine Leaf Roller, Grapevine Geometer, the Yellow Wooly Bear and species of cutworms.

The Grapevine Leaf Hopper, *Typhlocyba vitifex.*—This insect is very prevalent in the vineyards of the Peninsula. It is very small, about one-eighth of an inch in length and may be found in great numbers on the under surface of the leaf, and when disturbed takes flight very quickly. The larvae appear in June and moult several times. The moultage may be found on the under surface of leaf. The larvae resemble the adult, only smaller and wingless. They are sucking insects and can only be destroyed by contact insecticides, such as tobacco water, whale oil soap and kerosene emulsion.

Green Grape-vine Sphinx Moth.

Cluster of Grapes affected with Black Rot.

Grapevine Phyloxera, *Phyloxora vastatrix.*—This insect is very uncommon in our vineyards and is only occasionally found. The insect has two forms, one attacking roots, causing rotting and death, the other attacking the leaves, producing innumerable galls.

Fungous Diseases.

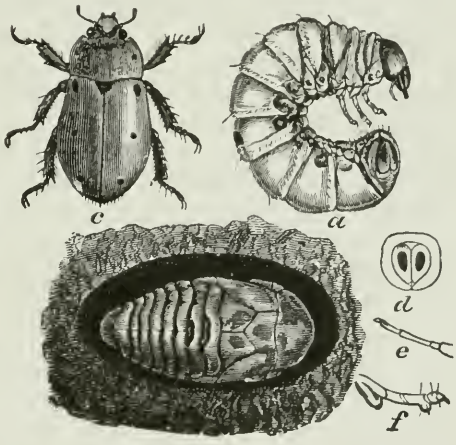
Black Rot. This is perhaps the most dangerous enemy of the grape. It is prevalent and seems to appear locally and periodically throughout the district. This, however, may easily be explained as it seems only to appear in those vineyards which are kept in sod, neglected or improperly sprayed. There are one or two exceptions to this, because I have found that in certain localities the disease seems to appear every year. One of these localities is on top of the first escarpment, near Vineland. It is the opinion of some growers that it more frequently appears on dry, sandy elevations, but the factor which seems most

favorable to its development is lack of atmospheric circulation, and I would strongly advise that vineyards should only be established on those positions of the farm which are not protected from the winds.

The growers as a general rule are aware of the tremendous damage that this disease will do in one night, but still many of them will not spray their grapes if they look clean. I have seen vineyards with very slight infections allowed to go unsprayed. This disease might quite easily be controlled by spraying with Bordeaux, but the spraying must be done before its appearance. When spraying after the disease appears, a minimum amount of lime should be used in neutralizing the bluestone, and I would strongly recommend the application of Bordeaux which has been made by neutralizing the bluestone with clear lime water rather than with the milk of lime.

The grower will probably first notice the disease in the fruit by one or two of the berries turning brown and gradually getting black. This will happen even when the berries are half grown. The berries will shrivel up and drop. When the disease has reached this stage it will make short work of the bunches. The

Phylloxera Galls on Grape Leaf.



The Spotted Pelidnota; *a*, grub; *b*, pupa; *c*, beetle.

first appearance is shown, however, in the leaves. Yellow spots appear near the vein of the leaves. It is often apparent, however, that the sun produces similar spots on the leaves, especially when they are tender. The yellow discoloration on leaves caused by the fungus is very noticeable in vineyards which are badly affected.

The fruit grower should destroy all diseased bunches and berries and not leave them to hang on vines as is too often the case. He should also endeavor to keep the vineyard cleaner. If clean methods are adopted and the vineyard sprayed at least twice every year, very little injury should result. The red varieties seem to be more susceptible and should be carefully sprayed.

Downy Mildew, *Plasmopara viticola.*—This fungus is quite common. It attacks the fruit, leaves and young shoots. The bunches and underside of leaves become mouldy, being covered with a delicate white film. The greatest damage is done to bunches. The berries do not develop so well and the appearance of the bunch is far from inviting. This disease is easily controlled by two sprayings of Bordeaux and if necessary an application of flour of sulphur, which is dusted on the vines in the morning.

Powdery Mildew, *Uncinula spiralis*—Attacks the grape in the same way as the downy mildew, but is more especially found on the canes. When berries are affected they show brownish or blackish spots. It is quite common in the Peninsula and the same treatment as for downy mildew is effective.

There has appeared quite frequently in our vineyards an undesirable condition of the vines, which has not been attributed to any particular cause. It appears mostly on sandy soils and attacks all bearing vines. Its first appearance is noted by a peculiar mottled yellow discoloration of the young leaves, and in the middle of the growing season the whole vine will turn yellow. The vine loses its thriftiness and the fruit does not develop so well as on other unaffected canes. This malady may or may not appear in succeeding years on each vine, but it will always be found in the locality of the vine in which it first appeared. I have noticed vines to regain their normal color the year after being affected, and the following year again will show almost an extenuated form of the malady. One vineyard which I have in mind is situated near St. Catharines. In the vineyard the vines seemed to get worse every year and this year they were removed. This peculiar malady does not seem to spread very rapidly, and its periodic appearance would tend to indicate that it might be caused by the lack of some constituent in the soil.

Spraying Grapes. Every vineyard should be sprayed at least twice every season, and the most successful vineyardist sprays three times. There are, however, hundreds of vineyards that are not sprayed at all and a great many more that are only sprayed once. It is hard to explain the reason for this. The grape is considered one of the hardiest and most resistant of our fruits and the necessity of spraying depends to a great extent on the weather. Very often a grower will neglect spraying his vineyard one year and will reap a good clean crop, so he lets it go the next year without any spraying. This is done even in cases where insects and diseases are found to a small degree. The grower does not seem to realize that this infection will gradually increase until their effect is strongly in evidence and considerable loss is sustained. After such an example the grower will spray for a few years and then again become lax. There is not a single vineyard in the whole district that has not been sprayed in which it is not possible to find the mildew or other diseases and there is no class of fruit which is so easily and cheaply sprayed as the grape and perhaps no fruit which is more quickly destroyed by fungous diseases. The lack of spraying of grapes seems to be largely due to the lack of knowledge concerning diseases and insects affecting the grape, and to the extent of the damage done by such pests.

It must be fully understood, however, that only economical spraying is recommended, and not promiscuous spraying as previously mentioned. There are some seasons which require less spraying to protect vineyards and an experienced grower will take advantage of this factor and perhaps save a few dollars, but this economizing should not be instituted until after the second spraying.

Sprays and Spraying. As grapes are not affected with the San Jose Scale it is not necessary to spray with lime and sulphur. The mixture universally used is "Poisoned Bordeaux Mixture," which is simply bluestone, lime and water, poisoned with one of the arsenical poisons. The formula generally used is 4 lbs. bluestone, 4 lime and 40 gals. water. This is poisoned with 2-2½ lbs. arsenate of lead, or 4-6 oz. paris green. The bluestone is dissolved and put in the tank, which is about half filled with water. The lime is then thoroughly slaked, diluted and poured into the mixture of bluestone and water through a fine strainer,

which removes the coarse particles. The poison is then made into thin paste, diluted and added to the mixture and the whole made up to the desired amount. Too great an excess of lime should never be used and the proportion of lime and bluestone should be adhered to.

Another form of Bordeaux Mixture which is used by one or two growers and which, I think, is greatly superior, is made in the following way: Forty lbs of good stone lime is slaked in a barrel and thoroughly stirred after it has properly slaked. Great care must be taken in slaking not to drown or burn the lime by use of too much or too little water during slaking. The formula adopted in this mixture is 2½ to 3 lbs. bluestone, 4 gallons of the clear lime water which is got by allowing the lime to settle. The same amount of poison and water is used as in the standard Bordeaux. The mixture should always be tested with ferro cyanide solution and if any red air colouration add more lime water. The value of this mixture is deserving more attention. In its manufacture only enough lime water is used to neutralize the bluestone and no lime sediment is present to clog the nozzles. The mixture is finer and more easily applied and as there is no excess of lime the fungicidal action of the copper sulphate or bluestone is immediate and constant until the application has lost its utility by virtue of the chemical action of the moisture of the atmosphere on the ingredients of the Bordeaux mixture. I consider the availability of the fungicidal action of the copper salts a very important factor, for we may be sure that should the spores of the disease be present there will also be active Bordeaux mixture to combat their development.

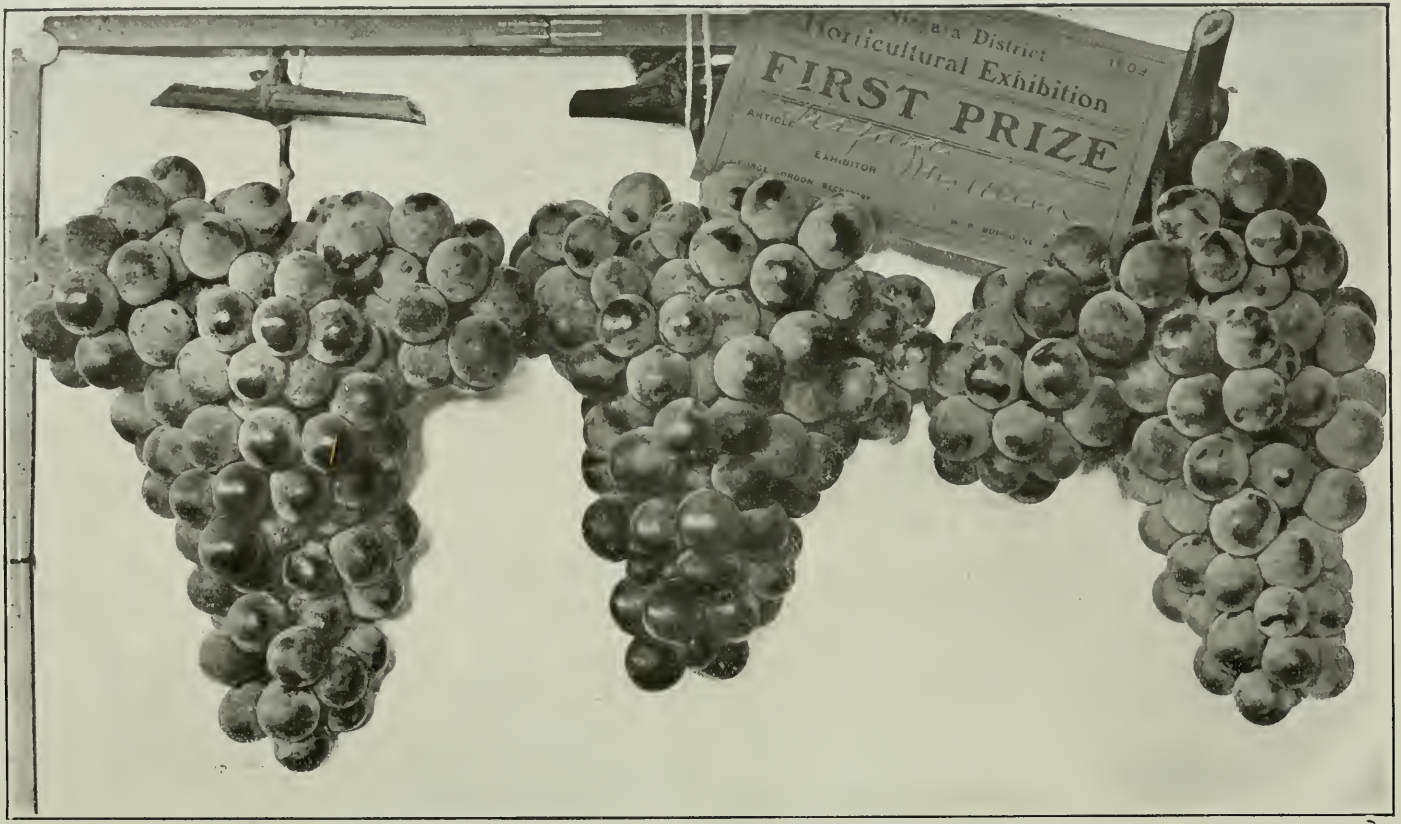
When to Spray. Grapes should be sprayed for the first time just before the blossoms appear, when the grapes are about the size of B.B. shot and about three weeks later and as many times after this as the grower feels it will be profitable. Under ordinary conditions, three sprayings is all that is necessary.

Spraying Machinery. There are at present several makes of grape sprayers. There are small two-wheel carts with a tank of 80-gallon capacity, wheel power with horizontal arms to which are attached nozzles which may be turned in any direction. This outfit at first looks very admirably adapted to the work. It does away with the handling of rods and all there is to be done is to drive up and down the rows. There are a lot of growers who like this machine and use it extensively, but I have never been able to convince myself that the work is done as thoroughly as when a man handles the nozzles. In the early sprayings before the foliage is fully out a great deal of spray is wasted and when the foliage is fully out the spray does not seem to reach the inner portions of the vines. I think the most thorough and effective method of spraying a vineyard is to apply the spray with a rod and nozzle cluster. In this way the man may walk behind the spray cart and can apply the mixture whenever it is most desired and the work is done with greater efficiency.

Varieties.

In no branch of the fruit industry in the Niagara Peninsula is there such uniformity in the varieties grown as in grape growing. There are a few standard varieties that every grower plants and they stick to these with the result that any quantity of these varieties may be had at almost any shipping point. The Concords are far ahead of any other variety in popularity, followed by the Worden, Niagara, Rogers 9 and 15, Delaware and Moore Early.

Early Grapes. A great difference of opinion prevails in regard to the advisability of planting early grapes. At one time Champions were destroyed



Typical bunches of the famous white grape, the Niagara.

A fine red grape, the Brighton.

The Lindley grape as grown in the Niagara District.

because they were thought to be valueless and yet on the top of all this our best growers have always made money from their early grapes.

Location is a great factor in deciding this question. Apart from the fact that every grower should have a few early grapes there are locations which, in my opinion, are better adapted for the production of early grapes than the late ones and will every year yield a greater profit. These special locations are found here and there in the western part of the Peninsula and their presence is due to some special location, good drainage or physical condition of the soil, but in the eastern part of the peninsula, and especially in the township of Niagara, there is a large acreage of land situated on the first bench of the escarpment in the neighbourhood of St. Davids, which offers every facility for the early production of grapes. The soil is admirably adapted and the fruit ripens from 5 to 10 days ahead of any other part of the Peninsula. The result is that the early grapes command a high price. Mr. F. A. Goring goes in extensively for the production of early grapes; succeeds in putting his crop on the market ahead of the other sections and derives the benefit of a strong demand and high prices.

Of the early varieties of grapes there are three grown in the district—Champion, Moore Early and Campbell Early. The Champion is the earliest grape, is bluish black in colour, a medium sized round berry, thick skin and acid until very ripe. There is quite a diversity of opinion regarding the value of this variety. The flavor is poor, yet it is a good bearer and if left on vines until ripe, the quality is not bad.

Moore Early is the best early grape; berries are large, round, black and thin skin; flavor is slightly foxy and flesh juicy. The vine is hardy, healthy and vigorous. It does best on light soils. It does not make enough wood on heavy soils. The yield is about two tons per acre.

Campbell Early. The berry is large, black, blue bloom, tough, rich flavor, flesh sweet, tender, seeds small; bunches do not fill out; is preferred by some growers to any other early grape.

GRAPES FOR MAIN CROP.

Worden.—Large compact bunch, large, black, thin-skinned berry with heavy bloom; flesh sweet; berry cracks easily and is not a good shipper or keeper. Good for home market. Its flavor is superior to Concord. It is hardy and a good grower. Yield 3¼ tons per acre.

Delaware.—The best table grape grown; bunch small, compact and shouldered; berry small, round, beautiful red, thin skin, whitish bloom, sweet delicious flavor. Vine is healthy and of fair vigor; does well on great variety of soil and is quite hardy. Too much wood should not be left as it is short jointed. Will overload if too much wood is left, with the result that the fruit will not ripen. Yield 2½ tons per acre.

Concord. The most valuable commercial variety; very prolific; strong grower; heavy, thick foliage which seems to enable it to resist the frost in the spring; less susceptible to black rot; bunch is large, compact, five to six inches long; berry large, round, black with heavy bloom; skin thick; flesh pulpy; flavor good when ripe; splendid shipper; yield 3½ tons per acre.

Niagara. The best white grape; bunch very large, compact and shouldered; berry round, medium-sized with whitish bloom; skin tough; pulp soft, juicy and sweet; flavor good, possessing a delicate muskiness when fully ripe. Vine is very vigorous and hardy; does well on variety of soils, but more inclined to black rot

on light soils. Color pale yellow and whitish yellow on light soils; yield 3½ tons per acre.

Lindley or Rogers No. 9. Large red grape, splendid flavor, thin skin, splendid shipper; does best on mountain wash soils; strong, vigorous grower; should be trimmed to seven buds to the arm. This variety is a poor fertilizer, the bunches not filling out enough. It is one of the best of the varieties. Yield 2½ tons per acre.

Agawam—Rogers No 15. Vine strong grower, productive; wood long jointed, should have long pruning; bunch large and compact, shouldered; berry large, thick skinned, brownish red; flavor very good; good shipper; inclined to be subject to black rot and mildew.

Vergennes. The best grape for winter use, large red berry, tough skin, juicy, good flavor, medium sized bunch; like Champion it bears five to six bunches to a bud, therefore should be trimmed short to five or six buds to a cane, if not it will overload and not ripen fruit. The vine is vigorous, healthy and productive and does best on the heavier soils; yield about 3 tons per acre.

Brighton. This is a beautiful red grape with an excellent flavor and of medium size; the bunch is large, shouldered, fairly compact and attractive looking. It is very hardy, healthy and vigorous, but slightly subject to mildew, very productive, but should be planted near other varieties that are good pollinizers. The season is medium and the variety only a fair keeper, but it is valuable for home markets.

In writing this article my aim was to explain as explicitly as possible the conditions of the grape industry in the Niagara District, and to describe the methods which are now in vogue. The fruit growers gave me every assistance that was in their power, and I take this opportunity to thank them, especially those whose names I take much pleasure in mentioning: Messrs. F. G. Stewart, R. Thompson, J. E. Henry, E. J. Smith and F. G. H. Pattison. On the whole, the grape industry is in splendid condition, and more uniform excellence has been obtained in this branch of the fruit industry than any other. There are three outstanding features which seem to have been neglected. First, proper attention has not been paid to the physical condition of the soil. This is especially so in the clay lands. Second, spraying has been more or less neglected. Third, much carelessness is displayed in the handling of the fruit by the growers.

While these defects may appear to be very great and would give the impression that the growers are very lax, there are, on the other hand, scores of growers that are up to date and treat their vineyards with every care, recognizing that these produce a very valuable staple crop.

APPENDIX "B."

FRUIT PRIZE LIST AT ONTARIO HORTICULTURAL EXHIBITION, 1909.

APPLES.

CLASS 1.—EXPORT VARIETIES—BARRELS READY FOR SHIPMENT.

Baldwin: 1st, Newcastle F. G. A.; 2nd, Dempsey, W. H., Trenton; 3rd, Oughtred, W. C., Clarkson.
Ben Davis: 1st, Chatham F. G. A.; 2nd, Oughtred, W. C.; 3rd, Sloan, R. R., Blyth.
Golden Russet: 1st, Sloan, R. R.; 2nd, Newcastle F. G. A.; 3rd, Oughtred, W. C.
Greening (Rhode Island): 1st, Norfolk F. G. A.; 2nd, Newcastle F. G. A.; 3rd, Gutthrey, J. B., Dixie.
King: 1st, Norfolk, F. G. A.; 2nd, Dempsey, W. H.; 3rd, Cunningham, Theo., Wyndham Centre.
Spy: 1st, Cunningham, Theo.; 2nd, Schulyer, Geo., Simcoe; 3rd, Newcastle F. G. A.
Any other desirable variety: 1st, Norfolk F. G. A.; 2nd, Cunningham, Theo.; 3rd, Oughtred, W. C.

CLASS 2.—EXPORT VARIETIES—BOXES READY FOR SHIPMENT.
(*Fruit Unwrapped.*)

Baldwin: 1st, Cunningham, Theo.; 2nd, Schuyler, Geo.; 3rd, Watson, W. G., Dixie.
Fameuse: 1st, Watson, W. G.; 2nd, Dempsey, W. H.; 3rd, Bunting, W. H., St. Catharines.
Golden Russet: 1st, Watson, W. G.; 2nd, Thompson, Robt., St. Catharines; 3rd, Cunningham, Theo.
Greening: 1st, Brown Bros., Humber Bay; 2nd, Michael, R. T., Brooklyn; 3rd, Watson, W. G.
King: 1st, Norfolk F. G. A.; 2nd, Watson, W. G.; 3rd, Dempsey, W. H.
McIntosh: 1st, Michael, Mrs. W. W., Oshawa; 2nd, Michael, J. G., Brooklin; 3rd Watson, W. G.
Spy: 1st, Schuyler, Geo.; 2nd, Cunningham, Theo.; 3rd, Watson, W. G.

CLASS 3.—EXPORT VARIETIES—BOXES READY FOR SHIPMENT.
(*Fruit Wrapped.*)

Fameuse. 1st, Watson, W. G.; 2nd, Bunting, W. H.; 3rd, Harkness, A. D., Irena.
Gravenstein: 1st, Oshawa F. G. A.; 2nd, Schuyler, Geo.; 3rd, Norfolk F. G. A.
King: 1st, Norfolk, F. G. A.; 2nd, Watson, W. G.; 3rd, Brown Bros.
McIntosh: 1st, Michael, J. G.; 2nd, Watson, W. G.; 3rd, Harkness, A. D.
Spy: 1st, Watson, W. G.; 2nd, Schuyler, Geo.; 3rd, Michael, R. T.

CLASS 4.—DOMESTIC VARIETIES—BARRELS READY FOR SHIPMENT.

Blenheim: 1st, Norfolk F. G. A.; 2nd, Parker, W. C., Humber Bay; 3rd, Oshawa F. G. A.
Gravenstein: 1st, Oshawa F. G. A.
Ontario: 1st, Dempsey, W. H.; 2nd, Parker, W. C.; 3rd, Gutthrey, J. B.
Tolman: 1st, Mothersill, G. B. Oshawa; 2nd, Norfolk, F. G. A.; 3rd, Schuyler, Geo.
Roxbury Russet: 1st, Norfolk F. G. A.
Any other desirable variety not named in Class 1: 1st, Gutthrey, J. B.; 2nd, Norfolk F. G. A.; 3rd, French, W. H., Oshawa.

CLASS 5.—DOMESTIC VARIETIES—BOXES READY FOR SHIPMENT.
(*Fruit Unwrapped.*)

Blenheim: 1st, Watson, W. G.; 2nd, Cunningham, Theo.; 3rd, Oshawa F. G. A.
Gravenstein: 1st, Oshawa F. G. A.; 2nd, Gutthrey, J. B.
Ontario: 1st, Watson, W. G.; 2nd, Parker, W. C.; Gutthrey, J. B.
Ribston: 2nd, Parker, W. C.
St. Lawrence: 1st, Watson, W. G.; 2nd, Dempsey, W. H.; 3rd, Brown Bros.
Any other variety not named in Classes 2 *and* 3: 1st, Cunningham, Theo.; 2nd, Norfolk F. G. A.; 3rd, Cunningham, Theo.

CLASS 6.—DOMESTIC VARIETIES—BOXES READY FOR SHIPMENT.
(*Fruit Wrapped.*)

Baxter: 1st, Stephens, C. L., Orillia.
Fameuse: 1st, Stephens, C. L.; 2nd, Harkness, A. D.
McIntosh: 1st, Harkness, A. D.
Spy: 1st, Stephens, C. L.
Wealthy: 1st, Stephens, C. L.

CLASS 7.—DESSERT VARIETIES—PLATES OF FIVE.

Fameuse: 1st, Jones, Harold, Maitland; 2nd, Watson, W. G.
Golden Russet: 1st, Parker, W. C.; 2nd, Bennett, C. A., Burlington.
King: 1st, Doan, Fred, Port Dover; 2nd, Norfolk F. G. A.
McIntosh: 1st, Jones, Harold; 2nd, Evertts, Nicholas, Iroquois.
Wealthy: 1st, Gutthrey, J. B.; 2nd, Parker, W. C.
Spy: 1st, Brown Bros.; 2nd, Bennett, C. A.
Spitzenburg: 1st, Schuyler, Geo.; 2nd, Norfolk F. G. A.
Any other desirable variety: 1st, Watson, W. G.; 2nd, Oughtred, W. C.

CLASS 8.—DESSERT VARIETIES—PLATES OF FIVE.

Fameuse: 1st, Stephens, C. L.; 2nd, Robertson, W. G., Morrisburg.
McIntosh: 1st, Robertson, W. G.; 2nd, Robson, W. M., Lindsay.
Spy: 1st, Stephens, C. L.
Wagner: 1st, Stephens, C. L.
Wealthy: 1st, Stephens, C. L.
Any other desirable variety: 1st, Stephens, C. L.; 2nd, Stephens, C. L

CLASS 9.—COOKING VARIETIES—PLATES OF FIVE.

Alexander: 1st, Watson, W. G.; 2nd, Brown Bros.
Baldwin: 1st, Challand, C. W., Marburg; 2nd, Brown Bros.
Blenheim: 1st, Norfolk F. G. A; 2nd, Watson, W. G.
Cayuga: 1st, Parker, W. C.; 2nd, Norfolk F. G. A.
Greening: 1st, Norfolk F. G. A.; 2nd, Michael, R. T.
King: 1st, Challand, C. W.; 2nd, Norfolk F. G. A.
Ribston: 1st, Norfolk F. G. A.; 2nd, Peart, A. W., Burlington.
Spy: 1st, Challand, C. W.; 2nd, Schuyler, Geo.
Any other desirable variety: 1st, Watson, W. G.; 2nd, Stephens, C. L.

CLASS 10.—COOKING VARIETIES—PLATES OF FIVE.

Alexander: 1st, McDonald, John D., Cornwall; 2nd, Stephens, C. L.
Baxter: 1st, Stephens, C. L.; 2nd, Johnson, Asa, Cowansville, Que.
Spy: 1st, Stephens, C. L.
Stark: 1st, Stephens, C. L.
Wolf River: 1st, Stephens, C. L.; 2nd, McDonald, John D.
Any other desirable variety: 1st, Stephens, C. L.; 2nd, Robson, W. M.

CLASS 11.—CONES OF FRUIT.

Ben Davis: 1st, Chatham F. G. A.; 2nd, Trevail, S., Courtice; 3rd, Oshawa F. G. A.
Baldwin: 1st, Watson, W. G.; 2nd, Parker, W. C.; 3rd, Gutthrey, J. B.
Blenheim: 1st, Watson, W. G.; 2nd, Brown Bros.; 3rd, Whyte, David, Woburn.
Gravenstein: 1st, Gutthrey, J. B.; 2nd, Oshawa F. G. A.; 3rd, Whyte, David.
Fallawater: 1st, Dempsey, W. H.; 2nd, Stevenson, W. H., Oshawa; 3rd, Watson, W. G.
Fameuse: 1st, Watson, W. G.; 2nd, Gutthrey, J. B.; 3rd, Parker, W. C.
King: 1st, Doan, Fred.; 2nd, Norfolk F. G. A.; 3rd, McConnell, H. L., Gravesend.
McIntosh: 1st, Watson, W. G.; 2nd, Oshawa F. G. A.; 3rd, Evertts, Nicholas.
Ontario: 1st, Dempsey, W. H.; 2nd, Watson, W. G.; 3rd, Bennett, C. A.
Scarlet Pippin: 1st, Jones, Harold.
Spy: 1st, Norfolk F. G. A.; 2nd, Bennett, C. A.; 3rd, Brant Packing Association.
Wolf River: 1st, Whyte, David; 2nd, Stephens, C. L.

PEARS.

Class 12.—Plates of Five.

Anjou: 1st, Norfolk F. G. A.; 2nd, Biggs Fruit & Produce Company, Burlington.
Bosc: 1st, Smith, A. M., Port Dalhousie; 2nd, Stewart, F. G., Homer.
Clairgeau: 1st, Thompson, Robt.; 2nd, Gutthrey, J. B.
Diel: 1st. Smith, A. M.; 2nd, Thompson, Robt.
Duchess: 1st, Norfolk F. G. A.; 2nd, Thompson, Robt.
Hardy: Hector, Vincent G., Erindale.
Howell: 1st, Delworth, Thos., Weston; 2nd, Bennett, C. A.
Kieffer: 1st, Bunting, W. H.; 2nd, Bennett, C. A.
Lawrence: 1st, Smith, A. M.; 2nd, Thompson, Robt.
Winter Nelis: 1st, Thompson, Robt.; 2nd, Stewart, F. G.
Any other desirable variety: 1st, Norfolk F. G. A.; 2nd, Stewart, F. G.

Class 13.—Export Varieties—Boxes Ready for Shipment. (*Fruit Wrapped.*)

Anjou: 1st, Thompson, Robt.; 2nd, Stewart, F. G.; 3rd, Biggs Fruit & Produce Co.
Bosc: 1st, Stewart, F. G.; 2nd, Thompson, Robt.; 3rd, Bunting, W. H.
Clairgeau: 1st, Stewart, F. G.; 2nd, Robertson, G. A., St. Catharines; 3rd, Thompson, Robt.
Duchess: 1st, Thompson, Robt.; 2nd, Robertson, G. A.; 3rd, Stewart, F. G.
Winter Nelis: 1st, Robertson, G. A.; 2nd, Stewart, F. G.; 3rd, Thompson, Robt.
Kieffer: 1st, Thompson, Robt.; 2nd, Jones, F. C., Beamsville; 3rd, Bunting, W. H.
Lawrence: 1st, Robertson, G. A.; 2nd, Stewart, F. G.; 3rd, Thompson, Robt.
Any other desirable variety: 1st, Stewart, F. G.; 2nd, Thompson, Robt.; 3rd, Robertson, G. A.

GRAPES.

Class 14.

Agawam, 3 bunches: 1st, Robson, W. M.; 2nd, Thompson, Robt.
Concord, 3 bunches: 1st, Thompson, Robt.; 2nd, Bunting, W. H.
Lindley, 3 bunches: 1st, Thompson, Robt.; 2nd, Stewart, F. G.
Niagara, 3 bunches: 1st, Bunting, W. H.; 2nd, Thompson, Robt.
Vergennes, 3 bunches: 1st, Thompson, Robt.; 2nd, Robson, W. M.
Wilder, 3 bunches: 1st, Thompson, Robt.; 2nd, Stewart, F. G.
Any other desirable variety: 1st, Bunting, W. H.; 2nd, Robson, W. M.
Black Grapes, 9 lb. basket: 1st, Bunting, W. H.; 2nd, Stewart, F. G.
Red Grapes, 9 lb. basket: 1st, Bunting, W. H.; 2nd, Stewart, F. G.
White Grapes, 9 lb. basket: 1st, Bunting, W. H.; 2nd, Thompson, Robt.
Black Grapes, fancy package: 1st, Stewart, F. G.; 2nd, Thompson, Robt.
Red Grapes, fancy package: 1st, Stewart, F. G.; 2nd, Thompson, Robt.
White Grapes, fancy package: 1st, Thompson, Robt.; 2nd, Stewart, F. G.

Class 15.

Display of fruits in commercial packages exhibited by an Agricultural or Horticultural Society, or Fruit Growers' Association, table space limited to 60 sq. ft. for each exhibit: 1st, St. Catharines Cold Storage Co.; 2nd, Grantham F. G. A.; 3rd, Norfolk F. G. A.

Display of fruits not in commercial packages exhibited by an Agricultural or Horticultural Society or Fruit Growers' Association, table space limited to 60 sq. ft. for each exhibit: 1st, St. Catharines Cold Storage Co,; 2nd, Norfolk F. G. A.; 3rd, Grantham F. G. A.

Display of apples not in commercial packages exhibited by an Agricultural or Horticultural Society or Fruit Growers' Association, table space limited to 60 sq. ft. for each exhibit. (For competition by growers in the counties of Wellington, Waterloo, Dufferin, Simcoe and all other portions of the Province north of a line from Orillia to Kingston): 1st, East Simcoe Agricultural Society.

PRESERVED FRUITS.

Class 16.—Quart Sealer of Canned Fruit of Each of the Following Varieties:

Blackberries: 1st, Mrs. P. Depottie, St. Catharines; 2nd, Morningstar, S., Goderich; 3rd, Whyte, David.

Cherries, black or red: 1st, Miss J. Reeves, Humber Bay; 2nd, Miss Ettie Rush, Humber Bay; 3rd, Mrs. P. Depottie.
Cherries, white or yellow: 1st, Mrs. P. Depottie; 2nd, Stewart, F. G.; 3rd, Thompson, Robt.
Gooseberries: 1st, Thompson, Robt.; 2nd, Stewart, F. G.; 3rd, Mrs. W. H. French.
Grapes, black or red: 1st, Delworth, Mrs. T.; 2nd, Morningstar, S.; 3rd, Stewart, F. G.
Peaches, white: 1st, Miss J. Reeves; 2nd, Bennett, C. A.; 3rd, Morningstar, S.
Peaches, yellow: 1st, Delworth, Mrs. T.; 2nd, Miss J. Reeves; 3rd, Bennett, C. A.
Pears: 1st, Mrs. P. Depottie; 2nd, Bennett, C. A.; 3rd, Thompson, Robt.
Plums, blue or red: 1st, Mrs. T. Delworth; 2nd, Whyte, David; 3rd, Mrs. P. Depottie.
Plums, green or white: 1st, Mrs. W. H. French; 2nd, Miss Ettie Rush; 3rd, Thompson, Robt.
Raspberries, black: 1st, Mrs. T. Delworth; 2nd, Bennett, C. A.; 3rd, Mrs. W. H. French.
Strawberries: 1st, Bennett, C. A.; 2nd, Miss Ettie Rush; 3rd, Thompson, Robt.

Class 17.—Pint Jar of Jam.

Black Currant: 1st, Thompson, Robt.; 2nd, Bennett, C. A.; 3rd, Stewart, F. G.
Gooseberry: 1st, Bennett, C. A.; 2nd, Mrs. W. H. French; 3rd, Mrs. P. Depottie.
Grape: 1st, Stewart, F. G.; 2nd, Thompson, Robt.; 3rd, Mrs. T. Delworth.
Peach: 1st, Thompson, Robt.; 2nd, Stewart, F. G.; 3rd, Mrs. P. Depottie.
Pear: 1st, Stewart, F. G.; 2nd, Mrs. T. Delworth; 3rd, Thompson, Robt.
Plum: 1st, Stewart, F. G.; 2nd, Thompson, Robt.; 3rd, Mrs. P. Depottie.
Raspberry: 1st, Thompson, Robt.; 2nd, Delworth, Mrs. T.; 3rd, Stewart, F. G.
Strawberry: 1st, Bennett, C. A.; 2nd, Mrs. P. Depottie; 3rd, Mrs. T. Delworth.

Class 18.—Half Pint Jar of Jelly.

Apple: 1st, Whyte, David; 2nd, Thompson, Robt.; 3rd, Bennett, C. A.
Crabapple: 1st, Stewart, F. G.; 2nd, Mrs. P. Depottie; 3rd, Whyte, David.
Red Currant: 1st, Thompson, Robt.; 2nd, Mrs. P. Depottie; 3rd, Stewart, F. G
Grape: 1st, Stewart, F. G.; 2nd, Whyte, David; 3rd, Bennett, C. A.
Quince: 1st, Thompson, Robt; 2nd, Bennett, C. A.; 3rd, Mrs. P. Depottie.
Raspberry, red: 1st, Stewart, F. G.; 2nd, Thompson, Robt.; 3rd, Whyte, David.

Class 19.—Grape Juice.

Grape Juice, unfermented: 1st, Stewart, F. G.; 2nd, Thompson, Robt.; 3rd, Bennett, C. A.

Class 20.—Specimen Apples of Standard Varieties.

Baldwin: 1st, Norfolk F. G. A.; 2nd, Thompson, Robt.
Greening (Rhode Island): 1st, Challand, C. W.; 2nd, Michael, R. T.
King: 1st, Challand, C. W.; 2nd, Parker, W. C.
McIntosh: 1st, McDonald, John D.; 2nd, Robson, W. M.
Spy: 1st, Oughtred, W. C.; 2nd, Johnson, Asa.

Class 21.—Box or Barrel Brands.

1st, Canadian Apple Exporters, Ltd., Trenton; 2nd, Oshawa F. G. A.; 3rd, Brant Packing Association.

FIFTH ANNUAL REPORT

OF THE

ONTARIO

Vegetable Growers' Association

1909

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

PRINTED BY ORDER OF THE
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To the Honourable JOHN MORISON GIBSON, K.C., LL.D., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I herewith present for the consideration of your Honour the Annual Report of the Ontario Vegetable Growers' Association for 1909.

Respectfully yours,

J. S. DUFF,

Minister of Agriculture.

Toronto, 1910.

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Ontario Vegetable Growers' Association

OFFICERS, 1910.

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Executive Committee: Thos. Delworth, Weston; C. H. Weaver, Dunnville; C. W. Baker, Byron; F. F. Reeves, Humber Bay; J. Lockie Wilson, Toronto.

Ontario Vegetable Growers' Association.

FIFTH ANNUAL CONVENTION.

The fifth annual convention of the Ontario Vegetable Growers' Association was held in the City Hall, Toronto, on Thursday, November 11th, 1909. The President occupied the chair.

PRESIDENT'S ADDRESS.

THOMAS DELWORTH, WESTON.

I extend a hearty welcome to the delegates here assembled, among whom I am pleased to see representatives from all the different sections of Ontario. We have also with us the Deputy Minister of Agriculture from Quebec, and Mr. C. W. Waid, New Carlisle, Ohio, President of the Market Gardeners' Association of America, which recently held its convention in Ashtabula.

Our organization has now been in working order for about five years, and results have far surpassed our most sanguine expectations. Our membership roll has each year shown a splendid increase, and our future is indeed bright. Our Association is a purely business one, and by meeting together as we do to-day, with our branches fully represented, we are in a fair way to make our calling a greater financial success than ever before. If we have accomplished no other result than sending to all parts of the country our splendid annual report filled as it is from cover to cover with the results of tested experiments, our work would not have been in vain.

Through the efforts of this organization the good work that is being done by vegetable growers in the United States is laid before you in concise form, showing what can be done by men of skill and capital to increase the output from gardens, the best kinds of seed and methods of storing, shipping, etc. Our branches, too, have done excellent experimental work, with the different kinds of home and foreign seed, furnished by your central organization. This good work we hope to continue in the future.

We are continuing to urge the Dominion Government to pass at the incoming session a workable Seed Control Act, and we have the assurance that our wishes will be met in this regard.

The procuring of suitable seeds has taken up considerable time in our Association for the last two years, and a committee was appointed to investigate this matter, and good work has been done. We found at the outset that a great many vegetable growers were unable to procure seed of the variety or type they were paying for. After investigation, we found that in some cases this was occasioned by actual fraud on the part of those handling seeds. Representations as to this have been made to our Government, and we have Mr. Clarke of the Seed Commis-

sion of the Agricultural Department, Ottawa, here to-day, and he will tell us of the work being done to eliminate our grievances. We must have legislation that will protect not only the vegetable grower, but the honest seedsman.

I attended the Market Gardeners' Association convention at Ashtabula, Ohio, and heard Mr. Watts, of the Pennsylvania Agricultural Station, speak upon this subject. This is not a problem that concerns us alone, but all over this Continent the Agricultural Stations are taking this question up, and bills are being introduced into a great many of the Legislative Chambers of the United States. Very few, as yet, have become law. They find legislation on this a very complicated matter. There is a large amount of investigation required before we can get any legislation that will help us, and we should do our part to further the end in view.

Mr. Watts, as a result of his investigation, stated that there were seeds suitable for vegetable growers which could not be procured from dealers, and he gave warning to the seedsmen that if they could not or would not take the trouble to procure these, the growers would organize and produce the seeds themselves. This question will be taken up later.

There is one point to which I wish to draw your attention, and that is where this seed is produced. Our experiments in onions were to determine the proper country to procure the seed from to grow in this Province. California, Ontario and French seeds were distributed. In all our reports, with one exception, the California seeds proved best. There was one exception, where the French almost, if not quite, surpassed the California; but the French seed requires a longer time to mature than we can give it in Ontario. The French seed gave the best satisfaction in Essex County, which has the longest season of any county in this Province. The place where the seed is grown makes all the difference in the world as to the result of the crop even though the type is the same.

This Association should give deep consideration to the marketing of our products. I received some information concerning their basis of marketing in Ashtabula, and I think it is fairly correct. Lettuce and greenhouse tomatoes are grown extensively there, twenty or twenty-five acres being under glass. The Ashtabula Tomato and Lettuce Association takes charge of the marketing of that product to a great extent. The lettuce is graded first, second and third. It is packed and shipped to one man in Pittsburg, who puts it on the market. Note these points: The first is that the growers are not all competing for the market. I understand that it is shipped to one place, and put on the market not in competition. They are sold by weight. Supposing that four or five of us were shipping five tons of lettuce, this man sells all that he can, and what he does not falls pro rata on all the shippers. In this way one man does not receive all the profit and the other does not bear all the loss. Whether that can be worked out here I cannot say, but there should be a way of lessening competition. We can find out the markets insufficiently supplied and ship to these.

Then there is the commission man. It seems strange that the profit does not go to whom it belongs, the grower. This is a question that will have to be considered in the near future. We decided to gain all the information possible concerning our industry here. Possibly the question of tariff will be considered shortly, and we want to be in a position to lay our case before the Government.

Vegetable Exhibit, St. Catharines Horticultural Exhibition, 1909.

ADDRESS.

F. G. Fuller, London.

Many gardeners and greenhouse men are not willing to tell all they know about their business. Many, when they get something good, keep it to themselves, and impart nothing of it to anyone else. Since the inception of our London Branch, I have received may valuable ideas by attending the meetings.

The procuring of seed is a difficult question to deal with. If it is poor, a poor crop results. Although we have discussed this matter in our directors' meetings in our home branch from time to time, progress is slow. I was appointed one of the inspectors of the experimental onion plots, which were carried on for the purpose of ascertaining the best source of supply for onion seed for this Province, and it certainly was of great importance. Some of the different seeds procured were absolutely of no use. It took time and labour at some cost, without any results. It seems to be a difficult thing to get honest seedsmen to obtain what we require. It is a question whether or not it would be better if the grower of vegetables would produce his own seed.

The question of the marketing of our products certainly needs our consideration. Many of us have not a home market for our produce, and consequently look to outside ones. In Sarnia the produce is nearly all shipped to other places, as there is no home market there. Consequently buyers from Montreal come in, and they name their own price to these men, and if it is not accepted the crops remain in the fields. I understand that onion growers have formed a stock company to store their produce, and keep it until the market is right, so as not to be outdone by the buyers.

Lettuce is sold here by the bunch, in London by the dozen, in Sarnia by the pound. Our Association should look into this matter in order to have all the markets sell by a uniform rule.

REPORT OF THE SECRETARY-TREASURER.

J. Lockie Wilson, Toronto.

The year 1909 has been a prosperous one for the different branches of the Ontario Vegetable Growers' Association. Your crops, on the whole, have been bountiful ones and prices fairly satisfactory, and the spirit of progress prevails throughout our members. The quality of your marketable products this year is of a high average, and the demand therefor is rapidly increasing. Not being a medical practitioner I am not in a position to definitely state that the decreasing death rate of this Province is entirely due to the increased consumption of your finished products, but you can at least claim a share in this improvement in the health conditions of our citizens.

You are to be congratulated on the splendid work done by your branches and members in this fifth year of your existence as an Association. Strong

Vegetables Bordered by Flowers.

branches have been organized at Woodstock, St. Thomas and Dunnville, and good work is being done in these sections.

The standing of the different branches is as follows:—

Toronto	Increase	31%	Tecumseh	Increase	40%
Hamilton	Decrease	21%	St. Thomas		%
Ottawa	Increase	4%	Woodstock		%
Kingston	Increase	187%	Dunnville		%
Ojibwa	Decrease	32%	Chatham		%
London	Increase	138%	Odd Members	Increase	67%
Sarnia	Increase	76%			

Hamilton and Ojibwa up to date show a slight decrease, while Chatham so far has made no returns.

The following statement shows the financial standing of the Association for the year:

Receipts, 1909.

Balance on hand from 1908	$	303 47
Membership fees to Central Association		57 50
Refund on Vegetable Growers' Entries at Horticultural Exhibition		37 00
Refund on Voucher No. 6 (Mr. Cowan)		60
Refund on Expense Cheque issued to delegate		5 65
Grant, 1909		666 00
		$1,070 22

Expenditure, 1909.

W. C. Coo, London, Reporting Convention, 1908	$	25 00
Grants to Ojibwa and London		10 00
Prizes in Membership Competition, 1908		20 00
Membership Fee to Horticultural Exhibition, 1909		5 00
Grant to Horticultural Exhibition, 1908		50 00
Services at Horticultural Exhibition, 1908. Arranging exhibits, etc.		15 00
Services of Caretaker at Horticultural Exhibition, 1908		2 00
Advertising in Horticultural Prize List, 1909		12 00
Vegetable Growers' Meetings and Organization Expenses		165 10
Convention Expenses, 1907		10 90
Convention Expenses, 1909		4 50
Onion Experiment, 1908		20 00
Onion Experiment, 1909		130 96
Auditing Books, 1908		5 00
Executive and Directors' Expenses, Secretary and Stenographic Services		139 44
Printing Constitution, letter heads, stamps, etc.		33 65
Exhibit of Vegetables at Canadian National, 1909		77 50
Delegate to Ashtabula		25 00
Total	$	751 05
Balance on hand		319 17

Ontario Horticultural Exhibition, Toronto, 1909.

In the prize competition for the largest comparative percentage of increase in membership during 1908, London won first and Sarnia second. Similar prizes were offered this year, and after a keen competition Kingston won first, London second, Sarnia third, and Tecumseh fourth. We made the usual grant of $50.00 to the Ontario Horticultural Exhibition and received a refund from it of $37.00 for entries made by vegetable growers.

Three Directors' and eleven Executive Meetings were held during the year. A resolution was passed by the Directors asking the Minister of Agriculture that they be allowed to co-operate with the Department in sending over an exhibit to the Royal Horticultural Show at London, England.

Mr. G. H. Clarke, of the Dominion Seed Division, Ottawa, who has been travelling extensively in Great Britain and other European countries, looking into the seed questions there, will address the convention, and I am sure that the work he is doing in this regard is greatly appreciated by our members.

The thanks of the Association are due to the Minister of Agriculture for acceding to the request of the Vegetable Growers to have the cabbage and cauliflower industries in the United States investigated.

In accordance with the resolution of the Executive, Messrs. Reeves, Fuller and Farquharson were appointed as inspectors of the experimental plots in the following districts: Woodstock, Scotland, Dunnville, Hamilton, Jordan Harbour, St. Catharines, Toronto, Guelph, London, Sarnia, Chatham, Tecumseh, Ojibwa, Leamington, St. Thomas, Ottawa and Kingston.

A quantity of foreign and home grown seed was purchased and sent out to the branches for experimental purposes, each branch being limited to two experimenters.

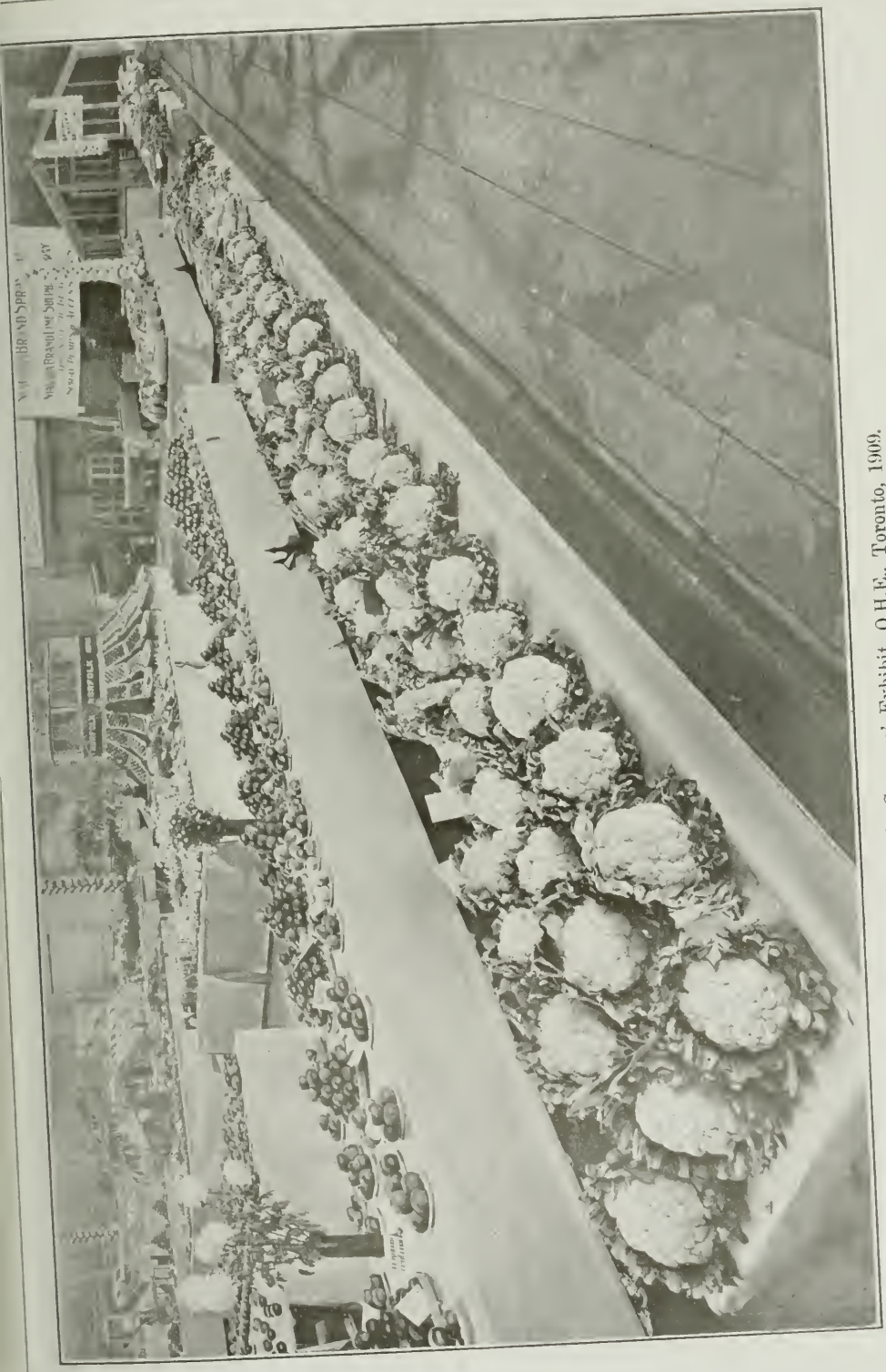
Samples of Nitro Bacterine were purchased and sent to Guelph, Jordan Harbour, Toronto, Ottawa and Essex and reports on same will be presented to you.

Copies of the last Annual Report have been sent to all interested in vegetable growing in Ontario, whose names have been forwarded to us, and many who have received it speak favourably of its educational value.

The exhibit of the Ontario Vegetable Growers' Association at the Toronto Industrial proved a splendid advertisement, and was greatly admired by the many thousands interested in vegetable growing who saw it. Prizes to the amount of $50.00 are being offered at the Ontario Horticultural Exhibition by our Association for canned vegetables in quart sealers, to be competed for by wives and daughters of members, also for a collection of same of not less than six varieties.

Our Association has a splendid future before it, and with the enthusiastic group of delegates here to-day, I am sure that the Convention of 1909 will long be remembered by all who had the privilege of taking part in its deliberations. I have to thank the directors and members for their hearty co-operation on every occasion where the interests of vegetable growers required it.

With the enthusiastic membership that we have now, and with the energetic and up-to-date vegetable growers in this Province, I know our organization will move onward and upward; and it remains for your officers and members to make this organization the success it should be. We have a fairly large membership, but we want to add to that, before this year closes, several hundred members.



Vegetable Growers' Exhibit, O.H.E., Toronto, 1909.

In conclusion, I wish to thank the officers and the members of the Vegetable Growers' Association in the different parts of the Province for the kindness extended to me, and as the years go by let us try to elevate and uplift not only ourselves, but our neighbours, and I am sure working from year to year together our organization will prove the success we all wish it to be.

NOTES ON SEASON'S WORK AT JORDAN HARBOUR.

H. S. Peart, Jordan Harbour.

The season generally was very unfavorable to plant growth and development. After a comparatively mild winter, the spring was cold and backward. On the well drained land at the Station, we commenced work on April 15th, but on the 16th, a heavy rain came, and, until the 20th, we had rain nearly every day, coupled with cold and dull weather. As a result of the cold, wet weather, our seeding proper did not commence until the 4th of May, which is very late for our locality. To make conditions even worse, the weather throughout the first part of May was cold and dull.

The rainfall for each month during the growing season was:—April, 2.03 inches; May, 3.68 inches; June, 1.88 inches; July, 2.67 inches; August,1 .79 inches; September, 2.35 inches.

A little explanation may be needed so that you may see how these amounts of precipitation affected the growth of plants. After the wet weather of April and May, a severe drought set in, the first part of June was very dry, and the ground, after so much wet weather, seemed to bake very hard.

The next drought was during the first two weeks of July, when we had very warm and very dry weather, with the result that the strawberries and the crops requiring a maximum of moisture at that season were reduced in yield from one-half to two-thirds of a normal crop.

This season, as last, we continued some variety testing and the fertilizer tests. We fruited a number of new hybrids and continued the work in crossbreeding and selection on tomatoes, melons and sweet corn.

The following varieties are some of the most promising we have tested. Some are old standbys and need no word of praise; others are new, and the growers may do well to give them a trial as to their relative merits when grown alongside of old varieties:

Corn.—Thomas Early, White Perfection, Early Champion, Country Gentleman, New White Evergreen, Zig Zag, Pearce's Early Evergreen, Golden Justice, Golden Bantam. As compared with Country Gentleman, at the time of harvest, the stock of Zig Zag was from a foot to fifteen inches taller, the ears larger and heavier. It has a heavier cob and possibly a little more grain.

Squash.—Summer Golden Crook Neck, Don's Extra Early White Bush, Scallop, Warted Hubbard, Golden Hubbard, Delicious and Long White Bush Marrow. There is really nothing new to offer among squashes. The corn and squash are placed in the order of yield, but the melons in order of quality.

Musk Melons.—Defender, Montreal, Green Nutmeg, Dominion Burrel Gem and Hamilton Market. Defender is yellow green in color, and is the finest melon in quality that we grow.

Home of R. J. Bushell, Kingston.

Water Melons.—Early—Watson, Sweetheart.

Medium—Black Boulder and Sugar Stick.

Late—Seminole, Alabama Sweet.

Carrots.—Half Long Scarlet Nantes, Rubicon, Scarlet Intermediate.

Beets.—Blood Turnip, Edmand's Turnip, Early Model, Black Red Ball, Egyptian. The carrots and beets were grown on a black clay loam. We had a very fine crop of tomatoes: the Earliana were on sand, down on the lake shore. This is heavier than the Burlington, and very much heavier than the Oakville sand.

Tomatoes.—Earliana (C. E. F. Strain), Bruce's Dominion Day, Early Jewel, McCalla's Selection, Freedom, Redfield Beauty and Ignotum.

Potatoes.—Davies Dunnville, Davies Warrior, The Howard and American Wonder.

This season we fruited over 4,000 crossbred tomatoes, and the seed of two of these which gave promise of future usefulness has been carefully preserved for future tests. Several selections of Earliana tomatoes were grown in a commercial block and the number of bushels of each recorded at each picking.

A selection made by Professor W. T. Macoun, C. E. F., Ottawa, was the earliest and also the heaviest cropper of the lot, showing what may be accomplished by careful and painstaking selection of seed plants.

There is also a selection made by Mr. Smart and Mr. McCalla. It is a mistake for us to buy our seed here and there for our tomatoes, when it is so easy for us to select our own seed when growing one or two varieties. It is primarily important to select the very earliest and best fruit from the best early plant in the field. As to what constitutes the best plant depends on the soil conditions. Around Toronto you should choose the weakest growing plant. What I want is one with a spread of about four feet, if you leave it alone. I mean a mature plant with the earliest ripening tomatoes.

While the results of our tests this year are not so favourable as we would desire, we feel that several of our plots will be of decided interest and value next year, as many of the new and crossbred varieties will be shown at their best, and some one or more interesting and valuable products may result therefrom.

Speaking about the potatoes, the Ohio and Manistee are our two best early ones. A little later comes Davies Warrior, yielding 282 bushels to the acre. This year the crop was reduced from a half to a third. It is a white potato. The eyes are not very deeply set, except at the end, where they are a little deeper than we like. The Davies Dunnville yielded 303 bushels to the acre this year. These potatoes are grown in single rows, 198 feet long and 30 inches apart. Then comes the Howard with 267 bushels and the American Wonder with 261. The Howard, however, is too yellow in color. The seed was grown at Guelph, and we received it in 1908. There have been no marked results in what was sent us for experiment. The Delaware, for some reason which I cannot explain, did not do well with us this year. It fell 98 bushels short of the Davies Dunnville, and the Wellington. We just finished digging last week, and part of them I did not see. I believe that they yielded about 213 bushels to the acre, with 193 bushels marketable, and were grown on heavy sand.

The commercial fertilizer used this season gave us very similar results to those of last year.

Plot 1.—No fertilizer.

Plot 2.—Complete 5 pounds potassium sulphate.
10 pounds superphosphate.
5 pounds sodium nitrate.

Plot 3.— 5 pounds sodium nitrate.
5 pounds potassium sulphate.

Plot 4.— 5 pounds potassium sulphate.
10 pounds superphosphate.

Plot 5.— 5 pounds sodium nitrate.
10 pounds superphosphate.

The following is a brief summary of the results which will show that the yield may be increased by the use of the fertilizer:

Tomatoes.—Decided increase in yield by use of complete fertilizer, also slight increase where potash and phosphoric acid were used over no fertilizer. But in plots where potash and nitrogen and phosphoric acid and nitrogen were applied, the increased vigor of the plants lessened the yield of fruit very materially.

Potatoes.—While the results were somewhat misleading it is evident that the plots where potash was used were better than those without it. The plots where no fertilizer was used gave the heaviest yield.

Corn.—The plots where potash and phosphoric acid were used gave the largest yield of ears, the complete fertilizer coming next. The use of nitrogen in this test also appeared to make stock at the expense of ears.

Onions.—The plots on which potash was used gave the heaviest and best bulbs. That having no potash, but with phosphoric and nitrogen, made a very poor showing.

Cabbage.—The complete gave heaviest yields, the one with potash and phosphoric acid next, while the plot on which nitrogen and potash and nitrogen and phosphoric acid were used were about equal.

We used several packages of Nitro Bacterine but with no results.

Mr. Mahony.—Does it make any difference what part of the country the seed of the Ohio potato comes from?

Mr. Peart.—I do not think so.

The President.—We shall hear more about this Nitro Bacterine later in the afternoon. It is one of Professor Bottomy's, of King's College, London, England, introductions, and when these things are sent out by scientists, it is our duty to test their efficiency. Our experiments were conducted with that view in mind. The general opinion is that Nitro Bacterine is of little use here.

GROWING GREENHOUSE VEGETABLES.

C. W. Waid, New Carlisle, Ohio.

The subject of "Growing Greenhouse Vegetables" or "Indoor Gardening," which I have been asked to present at this meeting is too broad to permit of a thorough treatment in the time allotted to me. I will, therefore, treat it in a general way, emphasizing certain points which I consider of special importance, and if I fail

to touch upon some phase of a subject in which you are especially interested, perhaps it can be covered in the discussion.

Development of the Industry.—The development of the vegetable forcing industry has been remarkable. It is a comparatively short time since the first commercial greenhouses were built for the purpose of forcing vegetables. In Professor L. R. Taft's book on "Greenhouse Construction" which was published in 1894, he says, "Perhaps the largest house ever erected for the purpose of vegetable forcing was constructed by W. W. Rawson, of Arlington, Mass. This house is three hundred and seventy feet long and thirty-three feet wide."

It is only fifteen years since this book was written, but such a house would be considered small to-day as compared with many modern plants which cover acres of ground under one roof. It has been during the last quarter of the century that the greatest development along vegetable forcing lines has taken place in this country.

In the United States, the development has been general in the section of the country lying north of the Ohio River and east of the Rockies, at least in that portion which lies east of the Mississippi River. There is hardly a city of 5,000 or more population in this territory in which there is not at least one person engaged in the growing of vegetables under glass. Most of the large cities support several vegetable forcing establishments. In a few instances, notably Boston, Mass., Grand Rapids, Mich., Ashtabula, Ohio, and Toledo, Ohio, the business has grown to such proportions that large quantities of vegetables are shipped to distant markets. President Dunbar, in his address at the recent Association meeting held at Ashtabula, said that fifteen years ago there were not many more pounds of lettuce grown in Ashtabula than there are tons to-day. This is probably true of the other chief centres of production mentioned.

In his annual report as State Vice-President for Ohio, Mr. H. H. Thorne gave some figures at the recent Convention which showed that the additions in Ohio during the present year amounted to over 20 per cent. of the total for last year. He placed the total area for Ohio at the present time at 100 acres, which represents, according to the figures, an investment of not less than $1,000,000. If the figures were available, a similar growth would, no doubt, be shown in other sections where the industry has developed in a like manner.

Why This Rapid Growth?—The question naturally arises, "Why has this growth been so rapid?" The answer is, "Because the business has been profitable." There are exceptions to this general statement. For example, during the recent financial depression, lettuce was so cheap in many sections of the country, that the returns for the sale of it did not pay the cost of production. Then, too, there are individuals who have engaged in vegetable forcing in various places who have not made a success of the undertaking. Taken as a whole, however, and considered for a period of years, vegetable forcing under glass has been very remunerative. I have heard of instances, and I have no reason to doubt the statement made to me, where the income from the crops grown in the houses the first season after building has paid for the cost of the construction. This is exceptional, however, and the person who engages in this business for the first time should not expect anything like such returns on his investment.

Kinds of Vegetables Forced.—By far the largest area under glass in the United States, used for forcing vegetables, is devoted to lettuce, cucumbers and tomatoes. Until quite recently, lettuce was the principal crop grown in the fall and winter, followed by cucumbers or tomatoes, mostly cucumbers, in the spring and early summer. At the present time tomatoes are grown quite extensively as a fall and early winter crop. In the vicinity of Boston and in a few places scattered over

the country, cucumbers are grown in the fall and winter as well as in the spring. In and about Chicago, peppers are forced in quantity. A few growers have succeeded with cauliflower, and radishes have proved a profitable crop in some cases. Parsley is also forced to some extent. So far as I know this constitutes the list of vegetables which have been forced in any considerable quantity. It is my opinion that the development of the vegetable forcing industry in the future will be more particularly along the line of an increase in the number of kinds of vegetables grown under glass rather than an increase to correspond with that of the past in the area devoted to those which are forced at the present time.

Varieties of Vegetables.—The varieties of vegetables grown under glass vary with the locality. The demands of the market must be considered in this connection. The eastern markets demand head lettuce, thus little but head lettuce is

Grapes—A Crop grown by many Market Gardeners.

grown by eastern growers. From Pittsburg west both head and leaf lettuce is sold in quantities in most markets, and as head lettuce does not do so well as the leaf, or has not, so far as it has been tried in Ohio and States further west, the leaf lettuce is grown almost entirely.

The vegetable growers who grow Grand Rapids lettuce, and this is the only variety of leaf lettuce which is forced in any quantity, are greatly indebted to Mr. Eugene Davis, of Grand Rapids, Michigan, for the origination and introduction of this variety. It was not until Grand Rapids lettuce was introduced that lettuce forcing in the central west became profitable.

The variety of cucumber commonly forced is the White Spine. Many growers, who have raised this variety for years, have, by means of selection, developed a strain of their own which is often superior to the original. Mr. Davis has originated and introduced a cucumber which some growers prefer to the White Spine. It is known as the Davis Cucumber.

There is a far larger number of varieties of tomatoes forced than cucumbers or lettuce. Some markets demand red fruit, others purple, and others do not discriminate as to colour. A complete list of all varieties grown under glass in the United States would, no doubt, reach 25 or more. Of the smaller fruited sorts the Comet, Frogmore's Selected Forcing, Hummer, French Marvel and A1, an English variety grown largely at Ashtabula, are among those most commonly forced. The list of larger varieties which are most satisfactory for forcing includes the Stone, Magnus, Beauty, Best of All, Success and Globe.

The tomato market during the winter prefers a small tomato of uniform size. There is not so much discrimination against large size for the spring and early summer trade, because of the fact that the price is not usually quite as high then as during the winter months.

Soil Treatment.—Unlike the florist, the vegetable grower does not renew the soil annually. In fact, the soil is seldom renewed in a vegetable forcing house. I know of one house in which lettuce has been grown in the same soil for 32 years, and the last crop was as good as the first. The physical and chemical properties of the soil are kept in a satisfactory condition for plant development by the addition of quantities of well rotten stable manure. In most cases manure is applied before the planting of each crop.

A few growers, including myself, practise a somewhat different method of renewing the soil fertility. After the tomato or cucumber vines have been removed, in July or August, a coating of manure is spread over the soil to a depth of 4 or 5 inches. Water is applied to this manure in the form of a spray at frequent intervals, at least twice a week. By watering in this way, the fertility in the manure is leached into the soil and the soil is never allowed to dry out. At planting time the coarser part of the manure is removed and the finer worked into the soil. If properly done, enough fertility is stored in the soil to supply the demands of all of the crops for the season. An application of manure in the form of a mulch, on the cucumbers or tomatoes when grown as a spring and summer crop, would no doubt help to hasten maturity and assist in conserving the moisture in the soil. Unless sufficient watering is done during the time the summer mulch is in force, the soil will not be supplied with enough available fertility and the results will, of necessity, be unsatisfactory.

In houses where certain diseases have gained a foothold, it is often necessary to sterilize the soil. Steam and formaldehyde are used for that purpose. Detailed instructions can be secured for giving these treatments by making application to any of the Experiment Stations located in States in which vegetable forcing is carried on extensively. The work should be done, when possible, during the interval between crops in the summer.

Cultural Methods.—Seeds and seedlings. Too much stress can hardly be laid on the importance of securing good seed to start with. Many crops of lettuce are greatly reduced in value because of the use of spurious seed. Inferior crops of cucumbers and tomatoes are frequently the direct result of impure or inferior seed. The seed is not an expensive item, and the best that is available is none too good. After a good strain has been secured, it is not a difficult matter to grow sufficient seed for one's own use. In making selections, the individual plant should be taken into consideration rather than a specimen or specimens of fruit without reference to the character of plant from which the fruit is taken.

Lettuce seed is sometimes sown in flats, but usually in beds set aside for that purpose. Muck which has been steamed or has had the action of the weather to sweeten it is a very satisfactory soil in which to start the young plants. The seed-

lings make fine root growth in such a soil. Good compost is also satisfactory for this purpose. The seeds should be covered but very little, if at all. Pure sand is best for this, as it offers practically no resistance to the tender sprouts, and very little damping off will occur where the surface of the soil is covered with a thin layer of sand. After the seed is sown and the soil is thoroughly wet, a layer of heavy paper or one thickness of burlap should be placed over it so as to retain the moisture near the surface. When the seed is sown in flats, a pane of glass can be placed over each flat. Care must be taken to remove the covering, no matter what it may be, before the seedlings have been drawn up by it.

As soon as the seedlings are large enough to handle, they should be pricked out into a good compost or muck. The usual distance of spacing the plants is 2 by 2

High Pressure Gardening, 1909.

inches. It is during this stage in the growth of the plants that the damping off fungus gets in its injurious work. Good ventilation will greatly assist in preventing damage from this cause.

Tomatoes are usually handled very much as described for lettuce during the early stages of the growth of the plants. Instead of transplanting to the permanent bed, at the second transplanting the seedlings are put in 2½ or 3 inch pots. When they begin to crowd each other they are again transplanted to four or five inch pots, in which they are grown until ready for the permanent beds.

Cucumber seed is usually sown in 3 or 4 inch pots, and not transplanted until the plants are set where they are to grow permanently. Cucumber seedlings are very much more particular as to temperature than lettuce or even tomatoes. A sudden checking while young will cause stunted plants, which will never do as well as plants which make a steady, healthy growth from the first.

Planting, Training and Care.

Lettuce.—Before any planting is done in the permanent beds, the soil should be made very fine to a depth of at least three or four inches. A sprinkling of tobacco dust over the surface of the soil just before planting is a great help in keeping the aphis in check. The beds should be marked out in such a way that it will be an easy matter to tell where each plant is to go. Leaf lettuce is planted at distances varying from 5 by 5 inches to 7 by 9 inches. If the market demands a small head, the plants should be crowded more than when the size is less important. More lettuce is planted 8 by 8 inches than any other distance. Our markets prefer small heads, and for that reason most of our lettuce is planted 7 by 7 inches. Nearly all varieties of head lettuce require more space than leaf lettuce, and should not be planted closer than 8 by 8 inches.

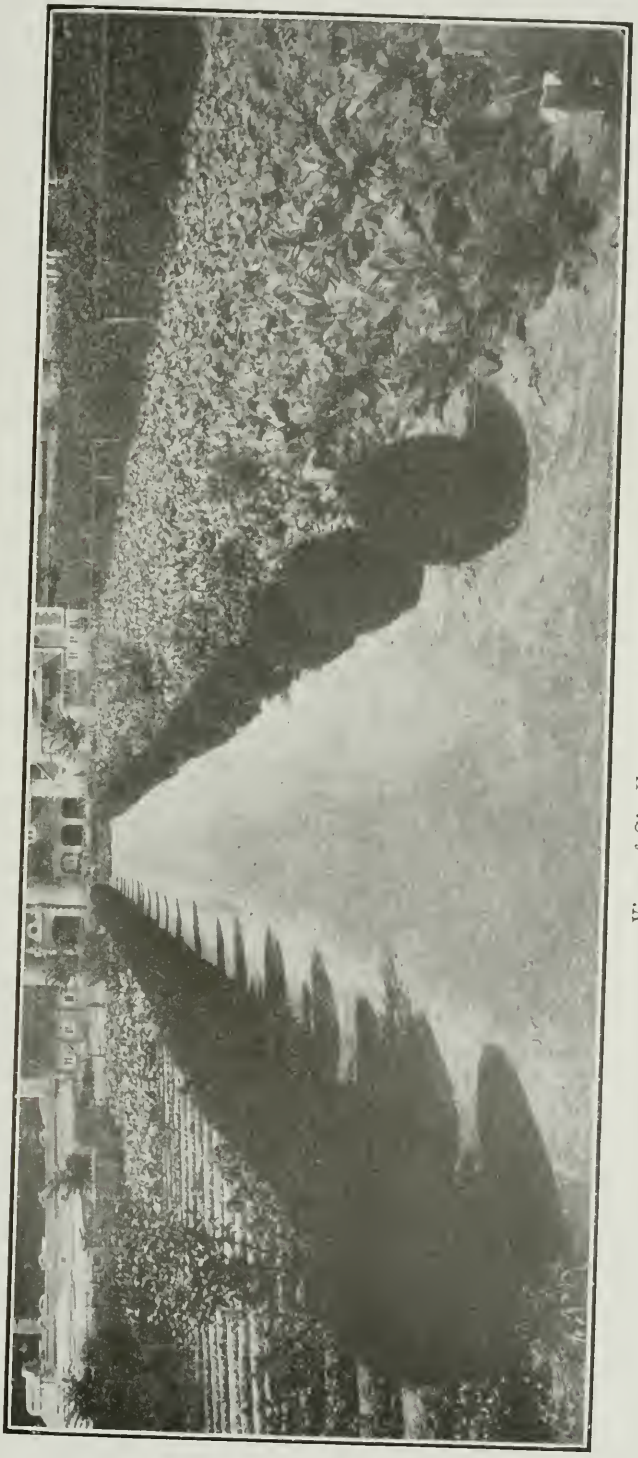
Care should be taken to set the plants at the depth they grew in the seed bed. Lettuce plants should not be so tall or spindling that they will not stand erect after being transplanted. As soon as set they should be watered. It is very important to have an abundance of moisture in the soil at that time, as the roots are so few and short that they are unable to take up moisture as easily as they can after the plants have become established and the roots cover a greater area. The soil should be stirred between the plants whenever a crust is inclined to form or weeds begin to show. Fumigation with some form of tobacco, preferably tobacco stems, should be made at least once a week, whether any aphis are present or not.

Cucumbers.—Equal care should be exercised in fitting the ground for cucumbers as for lettuce. The distance apart the plants are set varies greatly. Some growers set them in rows 6 to 10 feet apart, the plants being set from 6 inches to 2 feet apart in the rows. When set this way the vines are trained over wire trellises which are brought together at the top. Other growers train the vines straight up, setting the plants from 2 to 3 feet apart each way. It is our practice to set the plants 2 feet apart each way, allowing but one vine to grow from each plant, and all of the plants are trained straight up to a height of from 6 to 7 feet. The vines are not cut off when they reach that height, but are allowed to suspend from or run on the supporting wires. All side branches or laterals are cut off just beyond the first female bloom. Bees are kept in the house to fertilize the flowers. By twining the vines around the strings as they grow, little or no tying is necessary.

Tomatoes.—Tomato plants are easy to transplant, but they should be stalky and thrifty to give best results. Tomatoes are seldom planted over three feet apart nor less than eighteen inches each way. Our practice is to plant them two feet apart each way when trained to two stems and 2 feet by 15 to 18 inches when trained to one stem. All laterals are removed when small. The plants are tied to strings supported by wire. By twisting the plants around the strings, as the plants grow they are held upright and the amount of tying necessary is much less than when the vines are not twisted about the strings. When the plants have reached a height of about 5 feet the tops are cut off so that all of the strength of the plant will go towards the development of the fruit. The blossoms are hand pollinated by the use of a wooden ladle with handle 18 inches in length, and spatula with handle of equal length. Some varieties, such as A-1 will set a sufficient amount of fruit without hand pollinating, but most varieties must be hand pollinated not only to get the amount of fruit, but to insure smooth fruit as well.

Watering.

The overhead system of watering is rapidly coming into general use in vegetable forcing houses. It is a great step in advance over the old method of watering with



View of Sir Henry Pellatt's Garden.

a hose. It is ideal for radishes and very satisfactory for cucumbers, tomatoes, and lettuce. In our own houses we have sub-irrigation in raised cement benches in half of the plant, and ground beds and the Skinner system in the other half. Sub-irrigation has so far given the best results with lettuce and tomatoes, although good crops have been grown of both when the Skinner system was used. The chief objection to sub-irrigation is the cost of installation, but when one has this plant installed, the results are highly satisfactory.

Temperature and Ventilation.

Temperature and ventilation are so closely associated that it is hard to separate them. Leaf lettuce will stand a wider range of temperature than head lettuce. High temperature without ventilation will endanger any crop, while the same temperature with sufficient ventilation may do no harm. For leaf lettuce a night temperature of 45° to 55°, depending somewhat on the stage of growth of the lettuce, will give good results. The higher the temperature, other things being equal, the more rapid the growth, but at the same time the greater the danger from attacks of disease. A low temperature will produce a heavy crop, but it will be longer in growing than when the temperature is high. The day temperature for leaf lettuce should run at 60° or above, unless it is desired to hold the crop back, in which case the temperature may be lower. Head lettuce is usually grown at a considerably lower temperature, 40° to 45° at night and 10° to 15° higher during the daytime. It has been my observation that too little attention is given to the ventilating. Best results will follow when ventilation is given every day and throughout the day, except at times when heavy storms and very cold weather occurs.

Tomatoes demand a higher temperature than lettuce, otherwise they should be treated in much the same way. If the temperature is too high, and the ventilators kept too tight, the plants will make a succulent tender growth, and will be very susceptible to attacks of diseases. On the other hand, if they are given plenty of air, and the temperature is kept between 60° and 70° Fahrenheit, and 10° higher during bright days, a strong, vigorous growth will result, which will not only resist disease, but produce good crops as well.

Cucumbers are more difficult to handle than tomatoes, and the range of temperature should be less, while the night temperature should be somewhat higher. Sudden changes of temperature and draughts should always be avoided.

Other points in connection with vegetable forcing might be spoken of, such as the grading and packing of the products; and the subject of marketing, which would consume as much time as has been taken in considering all of the things covered, might be advantageously discussed, but time will not permit of further consideration of the subject.

Go where you may and you will invariably find that where a vegetable forcing house has been run successfully, there is some intelligent person behind it all. It does not, of necessity, need to be a male member of the human family, for women are often as much of a factor in the success of such an undertaking as men, but of all forms of intensive agriculture there are none which require more skill, patience, careful attention to detail, and incessant labor than vegetable forcing under glass. On the other hand, there are few lines of work which afford more pleasure to the person who truly enjoys the work or brings a better return for the labour expended than "Indoor Gardening."

The President.—How do you steam your soil for lettuce seedlings?

C. W. Waid.—It is steamed in boxes or vats prepared for that purpose. The steam simply runs through it, and the soil is sterilized on the ground. I have had

Exhibit at Western Fair, London Branch O.V.G.A., 1909.

muck left in piles over winter, but I have had no serious trouble. Do not take muck where the water has been standing a long time previous, or there is great danger of getting bad results. In sub-irrigation, we simply use a tile to carry the water into the soil. We have cement benches in our house, six feet wide and six inches in depth, and have three rows of three inch tile running lengthwise of the benches. Every 25 feet a tile is turned up to permit the hose to be placed in it as we water. We have the water convenient, attach a hose, and let the water run in this tile until it begins to show, then we know that the soil is thoroughly wet.

The Skinner or overhead system is simply forcing water through pipes in which nozzles are placed. I think that these are two feet apart. There has to be a pressure of 15 or 20 pounds, and many prefer 40 if you can get it. They throw a fine spray like that which you use on fruit trees. It is a very satisfactory method of watering, but there are objections to it. One is that the lettuce when it reaches a stage near maturity, is somewhat liable to be injured by watering with this system at that time. Again, there is a little loss of time using this method. The more uniform the watering the better results, and the cost of installing is not great.

E. E. Adams.—You have cement bottoms to your beds?

C. W. Waid.—Practically so. The tile passing through keeps them from souring. Our beds are raised. For our conditions, we feel justified in putting in raised benches. Just to show you the difference between raised benches and the ground beds, we planted one bed in each house of tomatoes on the same day, and we packed 800 pounds from the raised benches and 200 from the ground beds. The lettuce yield is also greater from the raised benches, where there is sub-irrigation. The yield per square foot varies from three-fifths to one and one-quarter pounds. About three-quarters of a pound is the average to the square foot. It is worth from eight to fifteen cents a pound: eleven cents would be a fair paying price. Lettuce, in the fall and spring, takes from six to eight weeks, but from eight to twelve in the middle of winter, and personally I do not like a large head—eight to ten ounces is as large as I would have it.

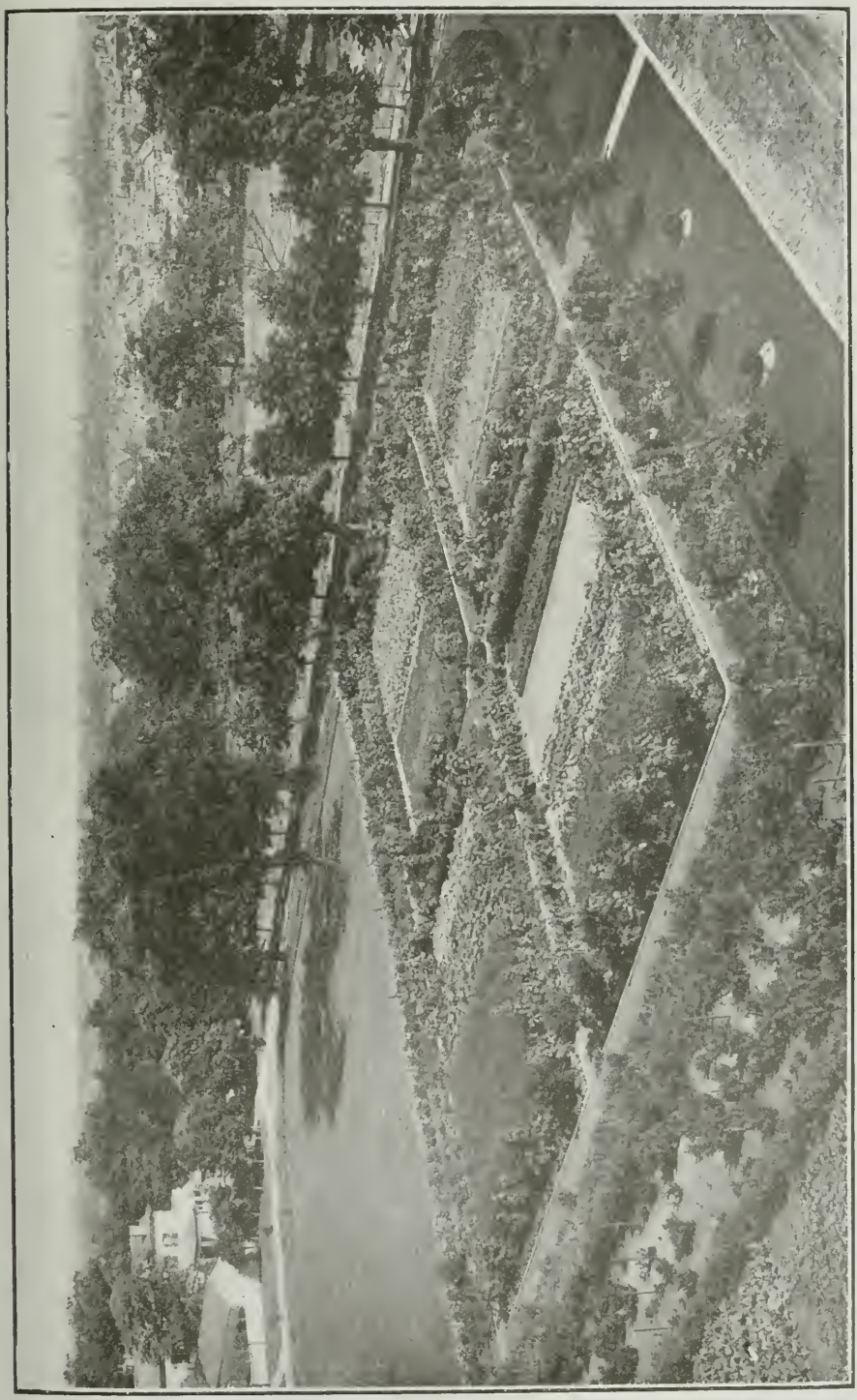
J. Lockie Wilson.—Our thanks are due Mr. Waid for his excellent paper, and no doubt very material benefit will accrue from it to all vegetable growers. I am glad to notice that spirit prevailing, that idea of sending out men to other countries to find out what is being done. We decided it was proper for us to send a delegate to the Convention at Ashtabula, and I am sure that the $15 or $18 that it cost us has been amply repaid, if for nothing more than bringing Mr. Waid here to speak to us on Greenhouses.

I am pleased to notice a representative here from the Province of Quebec. They are trying to better their citizens as we are. Our Dominion Government is working along these wide lines, and it sent out to the different countries of the Old World, the Dominion Seed Commissioner, and I am sure the results of that visit will be of lasting benefit to the people of this country.

I am sure this Convention will all heartily second my vote of thanks to Mr. Waid, President of the Greenhouse Vegetable Growers' and Market Gardeners Association of America.

The President,—You have heard the motion. We will consider it seconded bodily. (Applause.)

Mr. Waid.—I thank you very much. I shall be glad to tell any of you anything that I can.



Colonel Pellatt's Vegetable Garden.

ADDRESS

G. H. Clark, Seed Commissioner, Ottawa.

In assigning me a subject you have certainly given me plenty of scope. In communicating with your Secretary, he indicated that I would be expected to tell you something I had observed that would interest you in the Old Land. I am thankful to have that opportunity.

I went over there with three different objects in view. I wanted to get all the information that I could regarding markets for our clover seed. We have been having difficulties in seed testing, and I got information along that line. I visited a large number of experiment stations, and observed as closely as I could any plant breeding and selection that was carried on with the view of improving our field crops and garden crops. I visited small seed farms and quite large ones.

However, before I enter into that subject, I would like to tell you something of the work at Ottawa, particularly during the last three years. You will remember that in 1900 the MacDonald Seed Grain Competition took place, an idea of Professor Robertson's to lead out the young farm boys. Those who took part in that competition are now grown up men, and that work has developed into a full-fledged tree with branches all over Canada. If I were to look ahead as to the results of that educational work, I would predict that within twenty-five years the vegetable growers of the Province of Ontario will be able to get their supply of seeds, and about which you would have little complaint, from that Association.

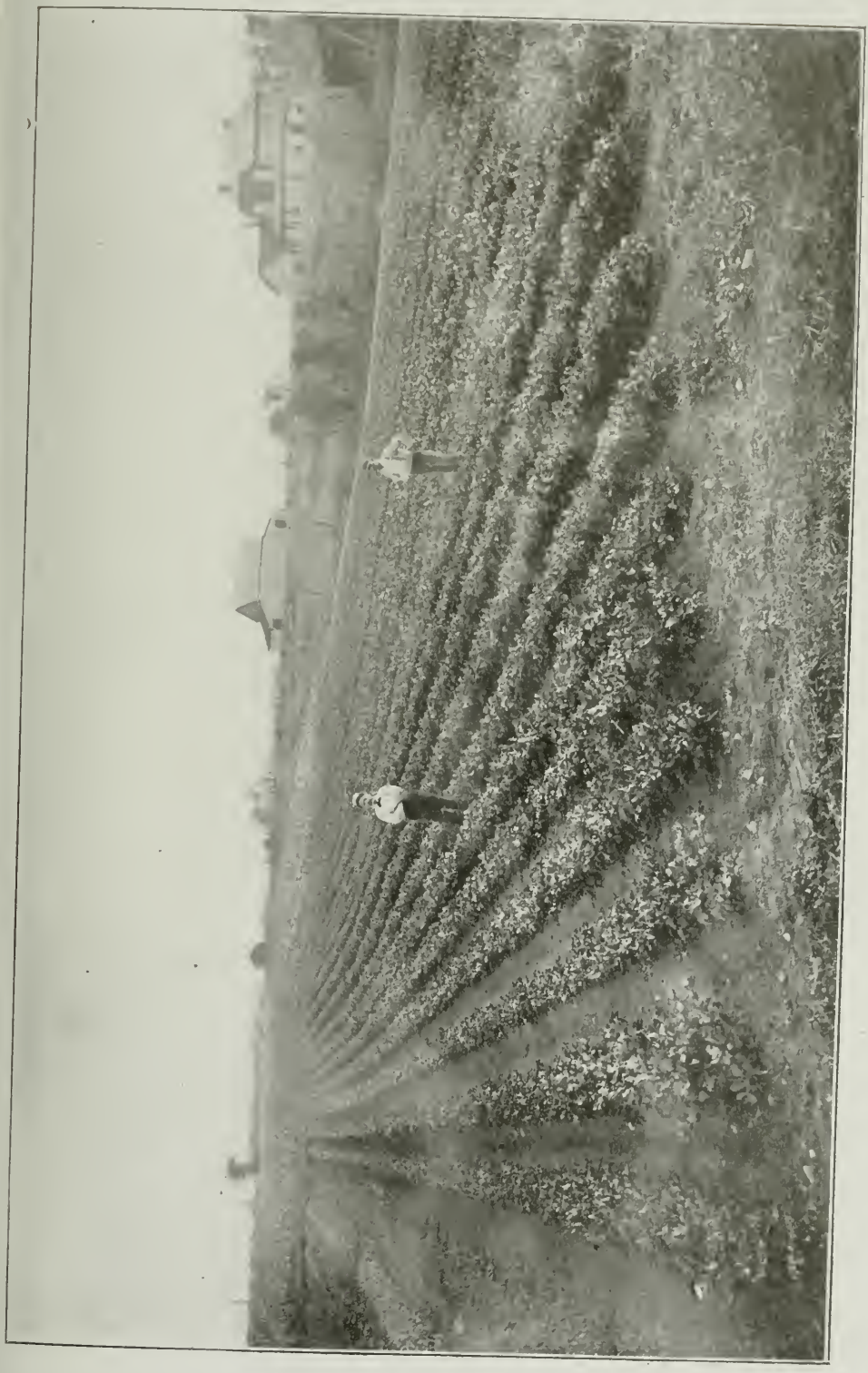
In 1902, a seed laboratory was started. Seed testing has been done both at Guelph and the Experimental Farm, Ottawa, for perhaps twenty-five years. Our seed laboratory was started to investigate that work. The condition of the grain and clover seeds was very bad. That investigation work was carried on in grain and clover seeds in 1902, 1903, 1904 and 1905, and led to the passing of the Seed Control Act, which came in force in 1905.

In 1906, we were authorized by the Minister of Agriculture to extend that investigation to field and garden seeds. The condition of the trade was not as good as it should be. This is the pursuit of the seed laboratory. We have not the facilities for making growing tests. You will not find that in any seed laboratory. We are dealing with vitality. We had no satisfaction in this work in 1906, but we learned much in the matter of collecting samples; and I present to you to-day the result of our investigation work in the vitality of vegetable seeds in 1907, 1908 and 1909.

Two or three are not given here. Sweet corn is grown both in Canada and the United States. Our friends to the south like their seed from the north. They import seed from Canada more or less all the time. Canadians get theirs from the south. It would be better to get it from a region with climatic conditions the same as our own.

The vitality standard for good seed is 95 per cent. Anything that falls under two-thirds of that is of low vitality. Assuming that to be the basis, I will give you in a summary form the samples received of low vitality. Regular seed inspectors are instructed to collect the seeds from actual seed merchants, and also to collect seeds done up in packages. About 20 per cent. of the samples we obtained were procured from the bulk lots kept by seedsmen. We have found that the seed sold by seedsmen or seed merchants very rarely, indeed, is of low vitality, that is, less than two-thirds of the standard of vitality fixed for good seed.

I want to refer to one sample of fifty, where the seed was obtained direct from the wholesaler. You would obtain it from the bulk lot in the stores of regular seedsmen. There was not more than one in fifty of low vitality. The seeds of low vitality



Field of Celery with Cabbage in Background.

Photo R. J. Bushell.

would probably be obtained from seedsmen that are not high class men. All vegetable growers, perhaps, during the last three or four years, have come across these seeds, and in this way we hear about them.

The other lots of seeds were procured through paper cases. You know papered seeds. You find them in drug stores and in grocery stores in paper packages put on the market by wholesale seedsmen. I shall roughly divide them into three classes. The first thing to be considered is that the seeds sent out by the wholesale firms are sold on a commission, and the residue is taken back by them. I do not know what is done with the seed that is taken back. We have found that these seeds are too mature. Then, there are other wholesale firms who put up papered goods and sell outright to the retail dealer. The residue is carried over from those show cases, and it is nothing to get a sample sometimes two or three years old, from which it is useless to expect a crop. It is as dead as a door nail.

There are other papered seeds put on the market by irresponsible or subsidiary companies controlled by a larger firm, and often they put them up under a spurious name. It is that seed on the market that constitutes a large proportion of the seed of low vitality. I do not know of any observation sufficiently strong that I can make regarding business men who do that work, men who are responsible seedsmen and put them out in that way.

Considering the percentage of the samples which were tested, of the seed grown in 1907, 13 per cent. were of low vitality; 1908, 31 per cent.; 1909, 15 per cent.

Kind of seed.	Vitality standard for good seed.		Number of samples of low vitality per 100 of the kind tested.					
			1907		1908		1909	
	⅔	of	No. tested		No tested		No. tested	
Sweet corn	95	64	39	13	39	31	85	15
Beans	90	60	10	0	20	20	110	16
Peas	97	65	13	8	19	26	109	17
Beets	160	107	42	9½	60	18	141	11
Cabbage	93	62	27	0	35	11	201	14
Cauliflower	90	60	6	0	12	0	....	....
Radish	95	64	35	6	41	10	224	9
Turnip	95	64	72	11	75	8	....	....
Carrot	80	54	60	35	55	23½	167	41
Celery	60	40	12	50	13	0	....	....
Cucumber	90	60	19	0	44	2	172	3½
Musk Melon	90	60	5	0	6	0	37	2½
Squash	90	60	13	0	21	24	53	26
Water Melon	90	60	11	9	12	17	37	13½
Onion	90	60	31	13	44	36	168	30
Lettuce	90	60	20	0	29	10	189	4½
Parsley	65	44	6	33	7	43	27	37
Parsnip	65	44	22	50	24	21	69	46
Pepper	60	40	5	40	7	57	20	50
Rhubarb	..	..	..	0	..	0	..	..
Sage	60	40	..	0	..	0	..	..
Salsify	85	57	10	70	6	50	..	..
Spinach	90	60	7	43	14	86	..	..
Tomato	90	60	14	0	19	0	108	17½

J. W. Rush.—What advantage will these tests be? Do you send your results to the different seedsmen you got them from, and insist upon the vitality being put on the package?

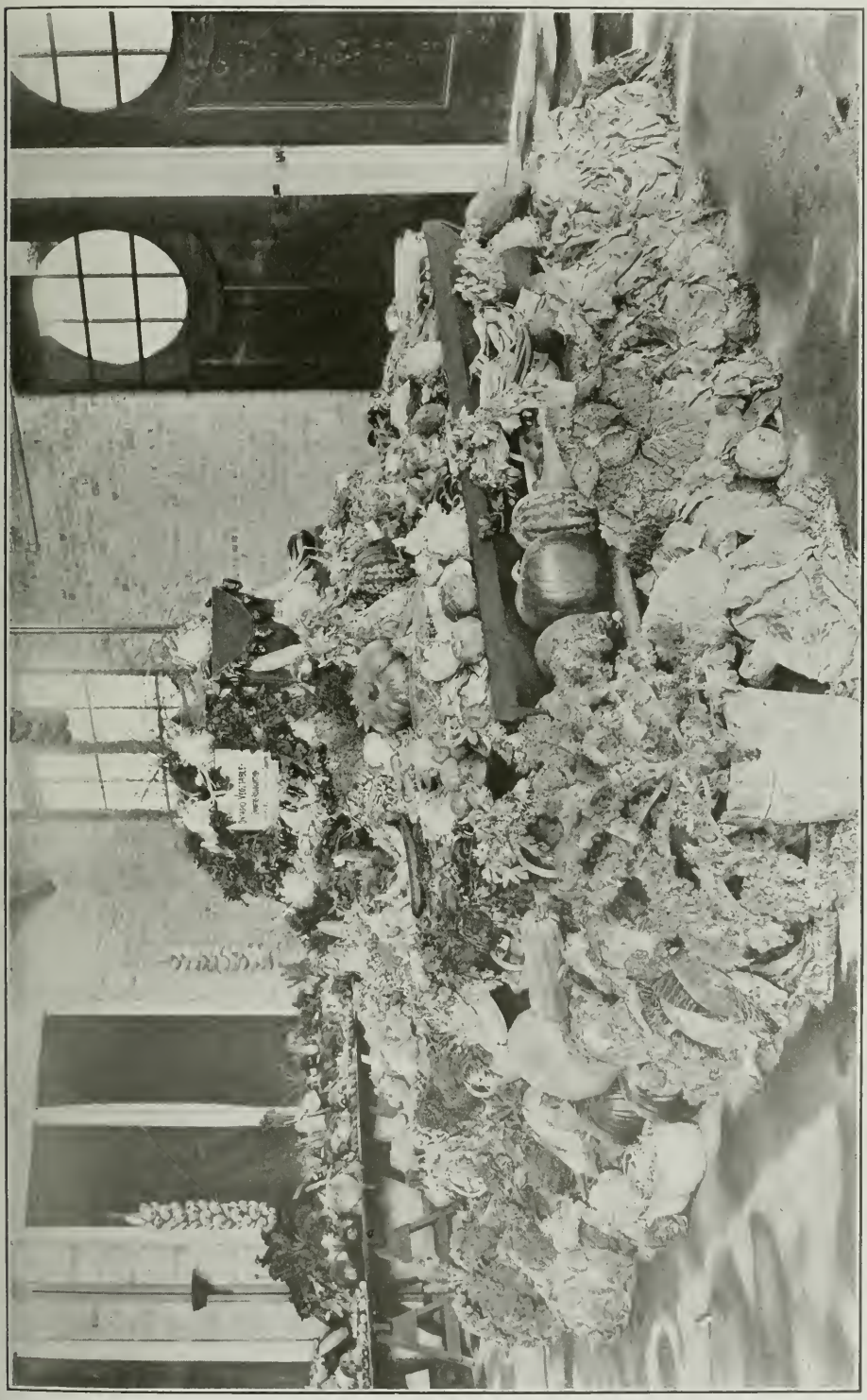


Exhibit by Ontario Vegetable Growers' Association—Canadian National, Toronto, 1909.

G. H. Clark.—We have no authority to insist upon anything. These investigations have been made so that the Vegetable Growers' Association will understand where they stand in respect to asking for legislation.

J. W. Rush.—How long do radish seeds retain their usefulness?

G. H. Clark.—It depends on the condition of storage. If they are kept in the cellar, four years, if in a grocery window, about three weeks. Salsify loses its vitality very quickly. The seeds reported on here have been tested for three years. Samples of papered seeds are not as good as they should be. I strongly advise all vegetable growers, as well as farmers and others, to get their seeds directly from competent seed merchants, men of ability and integrity, and you will not suffer from low vitality very much.

The question of quality in seeds counts for more than vitality. Vitality is one feature, but it is a feature of secondary consideration. It is very much more important to vegetable growers that when they get their seed, they get something true to kind and true to variety.

During the last fifteen years seed growing has developed to a considerable extent in the United States. Seeds come from Connecticut, from Ohio, and some from California. There are good seedsmen in California, and they know what to send to Canada. Two years ago, I had occasion to trace up a supply of onion seed that was used around Toronto, and I found that it came from the south of Europe. Canadians should get their supply from some district rather north than south.

The onion seed from Connecticut produces the best quality considering the crop. That from California seed had quite a proportion of thick necks. It is not necessary to deal with other countries in all of our seeds. Corn, peas and beans are grown here. In almost any country, there is seed growing done. The great bulk of our garden seeds come from England. France, Germany and Scandinavia. I was able to visit all these countries, but not being a horticulturist, I was not able to gather as much information as one of you would.

I visited a great many farms, on all of which seeds were grown in a small way. They are not particular as to whom they get their seeds from. When the seeds are ripe the growers do not know where it will be marketed. The same is true about those who grow clover seed in Ontario. When they have it in the bushel, they find a market for it. It passes from the hands of the small grower who usually grows one or two kinds of seed, into the hands of the middleman, and then into the larger warehouses of the exporter. It is to be expected that seed coming from this source would be a mixture of two or three varieties. I pride myself that Canadians do not buy their seed from that source. That seed is not marketed so much in Canada as in other countries.

The best system is in England. The seed is grown there under contracts which were arranged the year before by farmers, some of whom are market gardeners. Some devote three acres to a particular kind of seed, and grow it year after year. They do a good deal of selection, which brings a little bigger price, and thus encourages selection. They go through their crops and eliminate what is not true to type. This is generally done on large seed farms.

The seedsman is able to give pretty good assurances that the seed is true to kind, but when it comes to giving a definite assurance that there are no foreign seeds in them, he will not and cannot do that. At the same time nearly all of these men who have the seeds grown on contract handle a fairly high-class seed. There is always an element of risk which excludes them from entering into any definite assurance.

There is another and still better source, in Scandinavia, Norway and Denmark, and more particularly in Germany, where there are seed farms of 500 to 700 acres.

Everything is grown for seed. Wurtemburg is the largest seed centre in the world. Land is worth $600 an acre. To offset that I saw 107 Russian women working on one lot. These are quartered in a stable for cattle in the winter. They are comfortable, and are paid one mark (twenty-four cents) to two marks. They board themselves, but are given two acres which they look after in the evening, and on which they raise what provisions they can, and buy the rest themselves. This will give you an idea of the cheapness of labour in Europe.

On these farms I saw large staffs—as large as at the Agricultural College, Guelph. The men in charge of one farm are a doctor, a graduate of Leipsic, and a post-graduate of Berlin. On one farm there were 100 acres devoted to asters. The greatest care is shown in everything, and the work is done under the direction of very highly trained men who receive good salaries. It is very expensive to operate a farm of that kind.

These men are not obliged to guarantee the seed. They may print a catalogue for any market. They know that if you take that seed and put it in different climatic conditions, it changes considerably, but that seed, 99 per cent. true to that one variety, comes up to the standard of good seed, and I have no hesitation in recommending it here. I do not know whether any Canadian has courage to face this competition, but some get part of their supply here. I know that many farmers' clubs in buying seeds submit the amounts for tender to the seed merchants, and thus they get the cheapest price. Seed merchants quote the lowest possible prices, but it is a mistake to think that you can get ahead of them. If you have a seed merchant in whom you have confidence and can go and say, "I want so much vegetable seed, give me the best that can be got," and you know he will, do not change. He can get you the best, but you will have to pay one-half more than what you have been paying. However, that first charge is always compensated for by the increased value of your crop.

In the matter of legislation, I know a way to correct the trouble I mentioned in my report, the matter of vitality. If the Canadian seedsman cannot do that, a Joint Stock Company will not cost very much. Let the Ontario Vegetable Growers' Association form a co-operative seed company. I will tell you where you can get your seeds and with a guarantee as well.

J. J. Davis.—To-day some of us went to get some lettuce seed, and we had to pay $1.00 or $2.00 a pound. We preferred to pay $2.00. We hope we got the good seed that you have been telling us about. Those who buy cheap seeds cannot expect to get the best crops.

G. H. Clark.—It is quite possible that all of the seed comes out of the same bag, but different prices are charged. There is another way of getting improvement in the vegetable crops in Canada. I am looking forward to the time when the bulk of your seeds will be grown by yourselves or your neighbors. At the present time, perhaps, there are not many vegetable growers expert in doing that work. I saw it being done on large farms in Germany, Sweden and Denmark. I am quite prepared to do this, and the Minister has practically approved of it. I am willing to bring to Canada a man who has grown up in this work from his earliest boyhood, who will visit your farms once or twice a year, as well as answer your correspondence, to show you how to grow the seed.

It is difficult to control the seed so long as it is grown abroad. We cannot do that. The question of vitality can be corrected very easily. The people who suffer are those who buy the seeds in packages and who do not know the really good seed companies.

J. W. Rush.—Did you see cauliflowers put out for seed? Some old gardeners around Toronto raise cauliflower seed, but they are not doing it in the most up-to-

date way. Their idea is that any cauliflower that went off to seed should be allowed to run out. What is the correct European plan?

G. H. Clark.—I saw the Snowball Cauliflower in Denmark. There they have isolated plots for stock seed only, a quarter of an acre in extent. In that plot they transplant only the very perfect specimens. In some cases in Denmark they do not transplant. The plants are selected and are a sufficient distance apart to avoid any danger of cross-fertilization. Only the perfect plants before they come into bloom are taken and transplanted into an isolated spot.

REPORTS INSPECTION OF EXPERIMENTAL PLOTS CONDUCTED BY O. V. G. A.

F. G. Fuller, London.

I have not such a favorable report as I should have liked on account of the dryness of the weather. The seeds were procured and sent out to the different branches of vegetable growers. The seed that was sent out was numbered 1, 2, 3 and 4. Seed No. 1 was procured from California; No. 2 from Sutton, England, marked B, a French-grown seed; No. 3 Ontario-grown seed; No. 4, also a French seed from Sutton.

I paid a visit to Mr. Reeves, Toronto, who has a nice plot of onions. He prefers the California seed. It produces a good specimen of onion, of good colour and shape, and I consider it a first-class onion. It was sown on May 17th. No. 3 was very similar to No. 1, but not quite such a good type, but I could see very little difference. They were not quite so thick in the row, but the maggot thinned them out. No. 2 was not so large, although the type was good. No. 4 was really of very little use whatever. They were nearly all thick necks. Very few of them will mature.

Our next visit was to Mr. Delworth. His first sowing was on the 15th of May and the second on the first of June. The first sowing was very nice, but the crop was not as large as the one on Mr. Reeves' plot. No. 1 was first, No. 3 second, and Nos. 2 and 4 were no good at all. The second sowing the first of June showed the same results, but the crop was not nearly as large. I do not know if Mr. Delworth ever weighed his onions. I do not know anything about the weight in the green state, but Mr. Reeves' weighed, taking the 50-foot row, No. 1, 80 pounds, No. 2, 40 pounds, No. 3, 60, and No. 4, 20 pounds of marketable onions, and 22 pounds of culls.

E. E. Adams.—What do you call culls, thick necks?

F. G. Fuller.—Yes.

F. F. Reeves.—No. 4 is still growing.

F. G. Fuller.—At Hamilton and Scotland they did not try the experiment. I gained some valuable information when I was at the latter place. A great many growers there raise their own seeds. Mr. Fred. Smith grows a considerable amount himself, and his crop looked well. The growers there are working along that line. In Hamilton they did try the experiment. Mr. Duggan neglected his plot, and the results were not good, nor were Mr. Burton's. The results were just the same as the others with the exception that No. 3, the Ontario seed, was mixed with red. This was supposed to be Yellow Danvers. One out of every two would be a red one. I did not notice this with Messrs. Reeves' and Delworth's. Mr. Burton, however, had considerable red in his.

Earlianna.

At St. Catharines, Mr. Thompson conducted the experiment, but it was a failure. At Jordan Harbour, they said that the onion crop gave promise of being a heavy one, but they had a snowstorm, and, consequently, the crop was a failure.

At Dunnville, Mr. Hendershot received only Nos. 1 and 4. No. 1 was a very nice sample. No. 4 was the best I had seen anywhere. They were the largest, and appeared a good crop. They would need two months more to mature.

At Woodstock I saw another nice plot of onions grown by Mr. George Hart. There was very little difference in Nos. 1, 2 and 3. No. 1 was a little the best, but Nos. 2 and 3 were very little behind. It was a nice crop and bulbs were well shaped.

At Guelph the crop was about the same as at the other places. No. 1 was best, No. 3 second. No. 3 was mixed with red. No. 2 was a good colour and shape. The results with No. 4 were the same as in other places.

The conclusion I have come to in regard to these experiments is that the California seed is 20 per cent. better than any other of these lots of seed. No. 3, if the seed was true to type, would be 10 per cent. better than the best French grown.

G. H. Clark.—It would be well if the experiments were continued over a series of three years. In my opinion, if the onion seed growers in Scotland grew by selection, their seed would be as good as any produced in California. I have no doubt that the strain of onion seed in California was gotten by skilful breeding and selection. The growers of onion seed in California, when shipping north know which to ship and which not to. Onion seed that was grown in California fifteen years ago is not suitable for Ontario.

The President.—This series of experiments was started to demonstrate the difference in the crops resulting from the same variety of onion seed produced in different countries.

E. E. Adams.—Where did the two lots of Ontario seed come from?

The President.—One from Mr. McInnis, London; the rest from the Ontario Seed Company. We had to take the seedsmen's word as to the place of production. When I was in Ashtabula I met Mr. Peters, a large seed grower in California, and I think that we shall be able to get the seed from the actual grower.

REPORT OF EXPERIMENTAL PLOTS INSPECTED.

F. F. Reeves.

The places that I visited demonstrated the same facts that Mr. Fuller has stated. The California grown seed was the best, Ontario next, and No. 2 French after that. At London, Messrs. Davis and Baker experienced the same weather conditions as a good many others in various parts of Ontario. The season was very wet at first, and later dry, consequently there was a poor crop. No. 1 was the best and No. 3 was second.

At St. Thomas Messrs. Teeple and Lintoll had the same results as at London. I saw the best of the French grown seed here, the result being a pound difference between No. 1 and No. 2.

At Tecumseh, Mr. Robinette's plot was not looked after.

At Ojibwa, the best plot was grown by Mr. George Meloche, and No. 4 was very nearly the best, but required another two or three weeks of ripening. Mr. Meloche will agree that No. 4 was nearly equal to No. 1. I suppose that is due to Ojibwa being further south.

At Chatham nothing was done. At Sarnia, Mr. Broughton proved that No. 2 was pretty nearly equal to No. 1. At Kingston, the rain and wet weather spoiled the crop.

These experiments have shown what we started to find out, viz., what was the best source of supply. With what we have to work on at present, California grown is best. We should continue this another year. My idea is not to get the

Ashtabula Greenhouses.

seed from the seedsmen, but from the seed grower. I would get some from California, Connecticut, English or French and some Ontario.

A Member.—I understand that the seed is to be planted on the 15th of May and the 1st of June. Do you not think it should be done earlier?

F. F. Reeves.—You could not get on our land with a float then. I sowed some on the 16th April, and I got no crop at all. The sowing on 17th May was the one that I got results from.

Prof. Macoun.—We received some of that Nitro Bacterine to inoculate part of our tests. I have not heard any report on this from any one else. I noticed that in No. 1 there was a considerably greater yield, but in all other cases it was lower from the inoculated than the uninoculated. I did not consider in making up this table that No. 1 had a slight advantage owing to surrounding circumstances.

Onion Test, Carried on at the Central Experimental Farm, Ottawa, with Seeds Inoculated and not Inoculated.

No.	How Tested	Kind of Stand	Weight of Marketable	Weight of Unmarketable	Remarks
1	Inoculated	Good	52¾ lbs.	None	Medium in size
	Not Inoculated	Good	39¼ "	"	" "
2	Inoculated	Medium	22½ "	"	" "
	Not Inoculated	Medium	24¾ "	"	" "
3	Inoculated	Medium	33½ "	"	" "
	Not Inoculated	Medium	37½ "	"	" "
4	Inoculated	Good	33¾ "	22½ lbs.	Different onion from the three first
	Not Inoculated	Good	35¼ "	27 "	ditto Number still growing when harvested

All plots were sown in 40 foot rows on May 17 ; date up, May 28, and harvested Sept. 24.

The President.—With regard to that Nitro Bacterine, I used it and no appreciable results have been derived from the use of it. It is sent out by Professor Bottomy, and should be good.

Prof. Macoun.—The most reliable experiments are carried on in England, but it seems to have had no beneficial effect here.

G. H. Clarke.—Is not this Nitro Bacterine for legumes?

The President.—This was gotten out specially for onions.

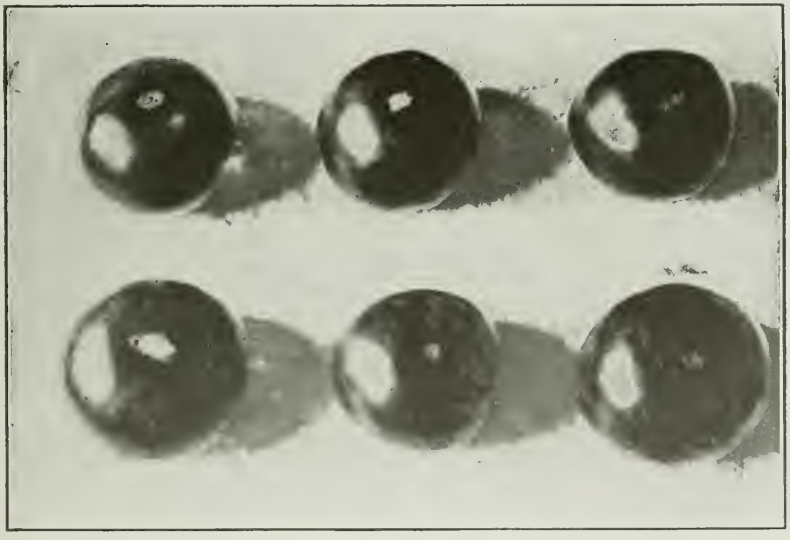
G. H. Clark.—Professor Bottomy has a good reputation in England. I have seen dozens of experiments where Bacterine was used on clover, and there in only one case did it do any good. I have heard of others where it is said to have been beneficial. There may be soil conditions that need something of that kind. It is not right to condemn it because it was not successful on your soil.

THE BEST METHODS OF INCREASING MEMBERSHIP AND FURTHERING THE INTERESTS OF THE ASSOCIATION.

C. W. Baker, Byron.

How best to increase the membership of the Ontario Vegetable Growers' Association is, to my mind, a subject of vital importance, and should hold a paramount place in our deliberations and discussions. When we realize the importance of our industry, which is carried on in many counties, and we as members acknowledge the benefits received through the Association, then, and then only, will we get that kind of enthusiasm which compels a man to get new members. Until recent years, vegetable growers seemingly did not recognize the importance of joining an Association which has for its aim the betterment of conditions among men engaged in this important branch of intensive farming.

There was a time when it was thought that a man who was not a success at anything could successfully raise vegetables; but to-day, what a change! A man must be up to date, must use brains as well as muscle, must read, study, inquire, and if he would be an entire success, be a member of a Growers' Association, and what better could he do than become a member of ours? All producers should have a chance to join us, and I believe from experience that vegetable and small fruit men only want to have the merits of this Association put before them in a proper manner, and we shall have branches all over the Province. In union there is strength. We can get needed adjustment of tariff more speedily by being an organized body than by individual effort. What we need are numbers. We should double our membership, and we can, if we go about it in the right way. I shall endeavour to tell you how the branch to which I belong increased its mem-



SUCCESS.
Greater Baltimore.

bership 100 per cent. It is time that we should show our appreciation of the Government's aid by doubling our membership.

To increase the membership of the home branch should be given first consideration. Perhaps I had better give you the experience of the London branch in doubling its members last year. We formed four committees, Vegetable, Seeds, Exhibit and Fruit. These committees went to work at once to attract members. The Vegetable Committee did a large amount of solid work, which, it is hoped, will bear fruit next year.

The Seed Committee did some valuable work along experimental lines, and also obtained first-class speakers to address the members on the subjects. The Exhibit Committee made a splendid exhibit at the Western Fair, and also were instrumental in bringing about important alterations in the rules governing competitions.

The Fruit Committee were particularly successful. The Secretary was instructed to obtain tenders on berry boxes, fruit baskets, etc. The prices were a

revelation to us, being away below what we as individual growers had paid in previous years.

We made it known that all needing these supplies could have them by joining the Association. The members came in in large numbers, a great many unsolicited. In fact, men stopped members of the committee and asked for membership. A comparison of prices for 1908 and 1909 will probably be interesting to you:

Individual buying, 1908.	Co-operative buying, 1909.
Berry boxes, $3.25 per 1000.	$2.75, saving 50 cents.
Grape baskets, $3.00 per 100.	$2.60, saving 40 cents per 100.
Tomato baskets, $3.50 per 100.	$2.96, saving 54 cents per 100.
Paris Green, 35 cents per lb.	33 cents per lb., saving 2 cents a lb. This was the best English Paris Green.

We had thus accomplished some practical work and demonstrated in a very forcible way to non-membership growers that it was a paying proposition to become a member of the Ontario Vegetable Growers' Association.

I believe that this year we can even obtain lower prices, if several branches would co-operate in buying their supplies from the same source. Another very important thing is to advertise your meetings beforehand, and afterwards to furnish the press with the reports. If these latter are written up in nice literary style the papers will be only too glad to use them.

The social side of the branch should not be lost sight of. Picnics, banquets, concerts and debates are great drawing cards. We should always remember that "All work and no play makes Jack a dull boy."

I think that the interest of the Association could be furthered by adding to our present name the words "Small Fruits." We have in our Association a large percentage of small fruit members, and I believe that it is doing them an injustice in not including the name. Several members have spoken to me about this, and I believe that the time has now come when we should make the necessary alteration. I cannot emphasize the importance of this too strongly, and I sincerely hope that the growers present will give this matter unselfish consideration, always remembering that the welfare of the Association lies in treating all members in an equitable manner.

I am exceeding optimistic of the future of the Ontario Vegetable Growers' Association. Notwithstanding that we have made a few mistakes, I look upon the matter in the same way as the optimist with the doughnut. The pessimist, saw nothing but the hole, while the optimist saw but little of the hole, and enjoyed the substantial part of it.

If all of our members looked upon the Association in this light, we would go ahead, and accomplish greater things. The man that gets out and hustles for the Association may make some mistakes, but he never makes the biggest one of all—"doing nothing." If you do not see an opportunity of getting a new member, make it, advertise for it. Opportunity will come and stay if you are looking for it. If you believe in the Ontario Vegetable Growers' Association, tell others about it, interest them, show them how they can make money before the crop comes in. Then, in conclusion, the best methods of increasing membership are, first, get enthused with the work of the Association; second, get your branch saving money by co-operative buying; third, advertise, advertise, advertise. Get into the papers everything that your branch does. You cannot over-estimate the

benefits of advertising. The biggest and most successful organizations in the world owe their positions to this, and I am sure it will help us.

J. Lockie Wilson.—I have been at many conventions, but I have never heard a finer or more concise address than the one just given.

C. W. Waid.—A little leaflet is helpful in increasing membership. Have the officers or others engaged in correspondence with people liable to become members slip one of these in their letters. Then, through our Association, we receive many reductions on purchases. Instead of using Paris Green, we use arsenate of lead. There is no danger of burning the foliage then.

The President.—I have found it very unsatisfactory. The potato bug thrives on it.

A Member.—My neighbour and I purchased 50 pounds, and we have used it with great success. We thought that we had an all summer job to beat the

Extensive Tomato Crop.

asparagus beetle, but I just had to spread it on once at the end of the cutting season. I am sure that I could not have done this with Paris Green.

C. W. Waid.—I would suggest that you get this insecticide from some reliable source, for I have found it very satisfactory.

The President.—No introduction of the Minister of Agriculture is necessary, but I think it only right and just to state that this Association appreciates very much the kindness of the Government and of the Department over which the Honourable Mr. Duff presides. We have had assistance from him not only with money, but in many other ways. One reason for this is, perhaps, because Mr. Duff is a practical farmer, and knows the difficulties under which gardeners labour. I have much pleasure in introducing the Hon. Mr. Duff.

ADDRESS.

Hon. J. S. Duff, Minister of Agriculture.

I am glad to have the opportunity and privilege of once more congratulating you upon the work which you have in hand, and to learn that the year has been a successful one with you. You meet here in order to compare experiences and profit by errors of the past, and will doubtless return to your homes imbued with renewed strength and vigour for the work you are engaged in and with fresh inspiration and enthusiasm gained by the interchange of experiences. Nor are the educational features of this convention for you alone. There are thousands of vegetable growers and farmers throughout our country who will catch the spirit of your enthusiasm through the pages of your reports, and profit by the results of your combined deliberations and practical conclusions.

I thank your President for the kind words he has been fit to say about the work being done by the Department over which, for the time being, I have the honour to preside. It is the duty of the Government to assist the people. It is particularly the duty of my Department to assist you along the lines which cannot be carried on by the individual alone.

We are trying to assist you to combat your enemies of the insect world, which are legion. We are endeavoring through the work of scientific men, who are constantly experimenting and discovering the best means of slaying your foes, to lend a hand for the uplift of the sturdy sons of toil. The work you are engaged in is a difficult one, but for those whose hearts are in it it has its compensations. I am glad to notice that as the years roll by, not only the Provincial but the Dominion Governments are assisting in this work more and more. I wish to congratulate you upon the excellent work you are engaged in endeavouring to accomplish. We are constantly in receipt of congratulations on the splendid reports issued by my Department, and those of the Ontario Vegetable Growers' have received commendation from those who have perused them. A good feature of these reports is the excellent illustrations, and in this regard we have taken a forward step. No finer reports than these issued by us can be found in any country in the world. They are prepared with the idea of making them irresistible, and once a person turns over a page or two he will be so interested that he will study them closely. I sent some of these reports, which are prepared by Mr. J. Lockie Wilson, to a number of people in my riding. I was calling on some friends, who live on the same line that I do, among them an old lady of ninety years of age, whom I had not seen for some time, and I wondered if she would know me. I said to her, "Do you know me?" She answered, "Yes, you are Jimmy Duff, and I saw your picture on the front page of one of the books. I read the report that you sent me twice, from beginning to end, and enjoyed it all."

The thought has occurred to me that our Department would do a good service to the different schools of Ontario if we placed copies of these reports in the hands of every public and separate school teacher. They would give a great deal of information to the children along gardening and agricultural lines. If the teacher was of the right stamp, the book could be used to great advantage in instilling the love of gardening and cultivation of the soil into the minds of the children.

Again, I wish to express my pleasure at seeing the work going on so well; and I want to thank you for the words you have said in reference to the work we have been doing. I trust as the years go by, that your Association will not only grow in membership, but, apart from that, if you get those who do not go to your meetings interested in your work, and acting on the advice and recom-

mendations that come to them through reports of your annual convention, you will have done a great service to the Province, and not only that, but a great service to yourselves. May the vegetable growth of this Province become greater and more extensive year by year, and more remunerative to those engaged in it.

W. A. McCalla.—We should, as an audience representing the vegetable growers of this Province, move a vote of thanks to the Minister for his words, and the assistance given to us in our business during the past year. I take great pleasure, then, in moving such a vote of thanks, not only for this audience, but on behalf of the vegetable growers throughout the Province. I am a rural trustee, and I have seen to it that these splendid reports are always placed on the shelves of the school library.

F. F. Reeves.—I had 40 extra ones, and I distributed them, and they were much appreciated.

Celery Crop Blanched with Paper.

J. W. Rush.—I want to pay a tribute to the Minister for his promptness. This summer, some shipments of corn, infested with the climbing clock worm, a serious pest, were received here. I got some of this corn, and brought it to the Minister. Mr. Duff got the papers to expose the matter and the importation of this pest was stopped immediately.

The motion was carried by a standing vote.

Hon. Mr. Duff.—Permit me to thank you. I do not want you to think that what has been done is all due to me. I want those here to know that if I was not a colleague of gentlemen who, like myself, are anxious to do all they can within reasonable bounds to advance the interests of Agriculture, I could do nothing at all. I shall be glad to tell my colleagues of the appreciation that you have shown for the work that we have been trying to do for you.

POTATO CULTURE, WITH ESPECIAL REFERENCE TO THE IMPORTANCE OF USING SEED OF STRONG VITALITY.

W. T. Macoun, Ottawa.

Before starting my subject, I would like to show you a specimen of a potato grown in Eastern Ontario, by Mr. John McEvoy, of Newington. It weighs three pounds and one ounce, and it was grown from seed imported from New Brunswick.

It is not necessary to give statistics to convince you of the great importance of the potato crop in Canada. When we consider that most of our people eat them at least once nearly every day of the year, we have some idea of the enormous quantity for home consumption. It will readily be seen that if by any experiments which may be conducted, or any information which can be given, we are able to cause a general improvement in the culture of this important food product, the total increase in production would be very large, even though but slight improvement were made in each individual case.

During the twenty years in which I have had charge of the experiments with potatoes at the Central Experimental Farm, Ottawa, I have been many times convinced that there are few, if any, crops which can be improved so much by better methods of cultivation as the potato. There is no field crop I know of where such a range in yield between different varieties and different strains of seed is found.

In 1904, in a test of 75 varieties of potatoes at Ottawa under fairly uniform conditions, the most productive variety yielded at the rate of 554 bushels per acre, while the least productive yielded only 123, a difference of 431 bushels. In 1905, in a test of 78 varieties, the highest yield was at the rate of 475 bushels per acre, and the lowest 114, a difference of 361 bushels. During the year 1906, 1907, 1908 and 1909, the yields in the experimental plots have been much reduced owing to drought, and other causes, which will be discussed later, yet the difference between varieties is still marked, the most productive yielding at the rate of 321 bushels per acre in 1909, while the least productive yielded only 17 bushels. Although this difference in productiveness is, under some circumstances, largely due to variety, much depends upon the kind of seed used. One might continue to show how the potato crop could be improved by thorough preparation of the soil, by using seed of the proper size, by cultivating frequently to conserve moisture, by spraying in good time to kill the Colorado potato beetle, and to keep the potato blights under control, and many other operations, which, if well done, mean an increase in the crop. All this, however, has been discussed so frequently that at this time I shall confine myself mainly to a discussion of the "seed."

Up to the year 1906 the importance of the source of seed supply in Canada had not been strongly impressed upon me, although in the previous year, while on a visit to England, I was struck by the importance of it there. At the Experimental Farm we had been growing some varieties year after year from the same stock, grown on very similar sandy loam soil. Each year the best potatoes were selected for planting in the experimental plots, and the results obtained seemed to justify the continuance of our own stock from year to year. Taking the results from four well known varieties, for instances, the average yields were the follow-

ing for the first four and the last four years in the sixteen years, 1890-1905, during which there was no change of seed:

	1890-1893. Bush. per acre.	1902-1905. Bush. per acre.	Increase Bushels per acre.
Early Rose	257	317	60
State of Maine	325	361	36
Empire State	301	338	37
Delaware	296	352	56

There was no indication of deterioration in the variety after sixteen years without a change of seed, but a fair increase, due, no doubt, to careful selection

Photo F. C. Hart.

Rural School Garden, Galt, Ont.—Sweet Corn Growers.

and good cultivation each year. But in the year 1906, there was a sudden change. That year was one of the most unfavourable seasons for potatoes that has ever been experienced at the Experimental Farm. During the early part of summer there was sufficient rain to keep the plants growing nicely, but just after the last cultivation, dry hot weather set in and continued all summer, with the result that the plants were stunted, the foliage dried up prematurely and there was a poor crop of tubers. Moreover, during the month of July there was a veritable plague of aphis which attacked the foliage, and doubtless did their share in lessening the crop. The best tubers were used for seed in 1907, but the best were small and

had prematurely ripened in 1906. The early part of the summer of 1907 was dry and the tubers did not form well. The crop was again small, although most of the tubers which formed became of marketable size and were clean and well formed. The best of these tubers were used for seed in 1908, but during that year there was never enough moisture from the middle of June until the vines died, notwithstanding thorough cultivation. A severe attack of thrips also checked the growth of the vines. Again, the best tubers were planted in 1909, and the seed used would have been considered by its appearance to be first-class, as it had been kept in a cool cellar, and the tubers were firm and showed little sprouting when the potatoes were planted, yet the results were very poor.

A table of the yields of the four varieties already referred to for the years 1906-09 is interesting:

——	Early Rose. Yield per acre. Bushels.	State of Maine. Yield per acre. Bushels.	Empire State. Yield per acre. Bushels	Delaware. Yield per acre. Bushels.
1906	150	132	132	103
1907	128	174	117	114
1908	69	97	117	156
1909	18	62	62	53
Average, 1906-1909	91	116	132	131
Average, 1902-1905, before the drought	317	361	338	352

It will be seen from the above figures that there has been a marked falling off in yield during the past four years, part of which, in the years 1907 and 1908, was doubtless due to the weakened vitality of the seed, and part to the very unfavourable seasons. In 1909, with a more favourable season and good cultivation, the small yield is evidently owing largely to seed low in vitality, although in 1909 there was considerable injury from diseases which caused the rotting of the stem. Newer seeds of other varieties yielded in these bad years as high as at the rate of 224 bushels per acre in 1906, 462 bushels per acre in 1907, 325 bushels per acre in 1908, and 321 bushels per acre in 1909, showing that notwithstanding unfavourable conditions, good seed gave good results.

The crop of potatoes had been so poor in 1906, and the prospects for a good crop in 1907 from the tubers not being thought favourable, it was considered desirable to compare the results with imported seed. Accordingly, a small quantity of tubers of six well-known varieties of potatoes were procured from the Experimental Farm, Nappan, N.S. As the best of the home-grown seed had been used in other experiments before this imported seed was planted, the results obtained that year are not considered reliable, but it may be said that the average yield from the imported varieties was almost twice as great as from the home-grown seed of the same sort. In 1908, it was possible to make a fairer comparison, and the best seed from the imported stock of the year before was compared with the best seed of the home-grown stock. The results given in the following table show that the extra vigour and productiveness of the imported stock were still maintained to a marked degree.

Name of variety.	Seed from Nappan, N. S. 1907. Total yield per acre, C.E.F., 1908.	C. E. F. Seed, 1907, Total yield per acre, C,E.F., 1908.
	Bushels.	Bushels.
Late Puritan	343	118
Rochester Rose	281	96
Early White Prize	272	123
Vick's Extra Early	213	156
Money Maker	213	118
Carman, No. 1	193	103
Average	253	119
Average difference in favor of Nappan Seed	133	

Carmen No. 3.—Potatoes grown on the farm of C. W. Baker, Byron. 912 bushels harvested off four acres.

The test was continued in 1909, new seed of some of the same varieties being obtained from Nappan again this year and compared with the Nappan stock of 1907, grown two years at Ottawa, and with our old stock. The results are as follows:

——	Rochester Rose.		Carman No. 1.		Vick's Extra Early.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Nappan seed, 1909	215	36	198	..	171	36
Nappan seed, 1907	127	36	52	48	198	..
C. E. F. seed	44	..	83	36	74	48

It will be seen from this table that in every case the Nappan seed of 1909 yielded much more than the Experimental Farm seed—nearly five times as much in one case, and more than twice as much in two cases. In two cases the Nappan seed of 1907 yielded much better than the Farm seed of the old stock, although in one case the Farm seed did a little better.

As showing that a change of seed does not always mean better crops, it may be mentioned that in 1905 tubers of the American Wonder and Empire State potatoes which had proved among the most productive at the Ontario Agricultural College, Guelph, were obtained from that institution for comparison with our own. As the quantity received was small, they were planted the first year on plots one-half the size of the uniform test plots, thus giving them an advantage when the rate of yield per acre was estimated. Our own strain of American Wonder yielded at the rate of 370 bushels per acre, while that from Guelph yielded 327 bushels per acre. On the other hand, the Empire State from Guelph yielded 381 bushels per acre, while our seed yielded 370 bushels per acre, a very slight difference. The next year, 1906, the year of the greatest drought, when they were all on plots of uniform size, the Empire State, Ottawa strain, yielded at the rate of 132 bushels per acre, and the Guelph seed 101 bushels. In the case of the American Wonder, however, the Guelph seed withstood the drought best and yielded at the rate of 180 bushels per acre, while the Ottawa seed yielded only 79 bushels per acre.

We have tried to show that a change of seed sometimes more than doubles the yield of potatoes. How shall we decide when it is desirable to have a change of seed, and what are the conditions which give seed strong vitality? If we know when to change our seed and where to get it from there is no doubt that potato growing would be much more profitable.

In the first place, every potato grower should be an experimenter. He should try on a small scale the varieties which other experimenters have found most productive. If he discovers a variety which is better than his own he should not only grow more of that variety, but if he is getting the seed he should, if possible, get it from the same source from which he obtained his trial lot, for if he obtained it from another source it might not do as well as his own.

If a grower has been getting but fair or poor crops from the variety he is growing he should try a change of seed, getting the same variety, perhaps. Moreover, when he has found that it pays him to obtain seed of a certain variety from a certain source he should endeavour by experiment and calculation to learn whether it will pay him to change his seed every year, every two years or every three years.

It has been fairly well shown, we think, that potatoes which are prematurely ripened either by an early drying up of the tops or are poorly developed on a weak vine, are low in vitality, and should not be used for best results. In Great Britain, it is now well recognized from the results of careful experiments that seed potatoes from the south of England, where the climate is comparatively dry and warm, and where the potatoes ripen much more rapidly than they do in Scotland or Ireland, do not give nearly as large yields as seed potatoes from Scotland and Ireland. In an experiment which I had the opportunity of seeing at Sutton & Sons, Reading, England, in 1905, where Scotch and English seed of the same varieties had been planted side by side, the English stocks were evidently three weeks nearer maturity than the Scotch stocks.

In an experiment conducted by the Department of Agriculture in Ireland and in England to determine the relative value of Irish and English seed potatoes the following results were obtained:

Irish Seed Compared with English Seed:

Showing the total average yield per statute acre from Irish and English seed potatoes grown at a number of centres in England and Wales in 1907:

	British Queen Average Total Yield				Up-to-Date Average Total Yield				Number of places where tested
	Irish		English		Irish		English		
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
England.....	331	48	314	4	411	8	238	56	32 centres
Wales	321	32	292	8	419	4	249	40	5 centres

"I'm Sweating." Photo F. C. Hart.
Boy's School Garden, Galt.

It is now fairly well proven that the cause of seed potatoes being better from Scotland and Ireland than from some parts of England is that the tubers in the former countries are not hurried to maturity by hot, dry weather, and on this account have more vitality or power to make strong growth when planted than where the summers are comparatively hot and dry. Coming nearer home, the conditions in the drier and warmer parts of Ontario may be compared with England, while the conditions in the moister and cooler parts of Ontario, Quebec and the Maritime Provinces may be compared with Scotland and Ireland. It is pos-

sible that as marked results could be obtained from a change of seed from Northern Ontario as from Nappan, Nova Scotia. It may even be that seed potatoes from a cool, moist clay loam soil near home might show some striking results.

There is a difference between immature tubers and prematurely ripened tubers. Potatoes grown in cool climates tend to be immature. Potatoes grown in warmer climates tend to be prematurely ripened. Immature potatoes may have been growing vigourously and the tops be cut off by frost, or they may be dug before the tops are dead and before they are perfectly ripe. The tubers are checked in growth but are full of vitality. It is interesting to note that immature potatoes have been recommended for seed potatoes in England for at least one hundred years.

The Department of Agriculture for Ireland makes this recommendation:

"Immature Seed:—It is now recognized that seed from crops lifted before they are fully mature will produce more vigourous plants, and, consequently, heavier yields than seed from crops which have been allowed to become fully ripe. In Ireland, this applies more particularly, perhaps, to early varieties, but it is a point worthy of notice by growers of seed potatoes."

At the Central Experimental Farm the seed from tubers grown from potatoes planted on June 23rd, and even on July 7th, 1899, yielded in 1900 more than those from potatoes planted May 22nd. 1899. The late planted ones were not so mature, or were immature when dug.

We shall leave this subject now with the recommendation that all growers of potatoes should try some seed from a cooler and moister climate where potatoes have been grown under good cultivation. It would be valuable work for the Association to try some co-operative experiments in this direction.

ADDRESS.

Emile Plante, St. Jerome, Que., Representing the Agricultural Department, Quebec.

I am pleased, and deem it a great honour to have been invited by the Minister of Agriculture of the Province of Quebec, to attend your interesting Convention here to-day.

I accepted the invitation with great pleasure, because I knew that I would learn something at this meeting of the Ontario Vegetable Growers. The Minister of Agriculture, Quebec, regrets that he was not able to be present and I fear I shall not be able to represent him as well as I should desire.

I have spent two very agreeable days, yesterday at the Convention of the Fruit Growers, and to-day here, and I am taking home with me a package of knowledge, much that will be of use to our Department and the vegetable and fruit growers of the Province of Quebec. I heard the Minister of Agriculture speak about the instruction of the youth of this country. It is through education that Agriculture has made so much progress in Canada. It is by education that we shall continue making this great progress. In the Counties, where the young have not had the opportunity of educating themselves, Agriculture is not progressing as in the other sections. I am speaking for the Province of Quebec. You seldom meet a man there but what says "I wish I had been better educated." I hope that the next generation will not have to say that.

I present my felicitations to the ladies. Women are of great importance on the farm. There is the old saying, "A little wife well willed, a little farm well tilled, and a little barn well filled."

Ontario is a great Province, and we are endeavouring to do our part in the

Strawberries in blossom.

Province of Quebec, which is in some respects not as up-to-date as it should be. I am sorry that I am not able to have addressed you, as I would have liked, in the English tongue, but when I come again, as come I will, if you will permit me, I trust that I shall be able to take a more active part in your deliberations.

SMALL FRUITS IN CONNECTION WITH VEGETABLE GROWING.

W. A. McCalla, St. Catharines.

My subject of "Small Fruits in Connection with Vegetable Growing," is a little difficult to handle. We have been listening to a paper which dealt with distinct facts, the result of careful experimentation. My subject is a discussion of something which comes into our practical work, but which is outside of it, nevertheless. I propose for a very few minutes to consider the question in a general way, and then perhaps, take up some details in the way of suggestion which may help individual growers to come to some conclusion in this matter.

In this age the concentration of effort and the acquiring of knowledge are the main aids to the business of vegetable and small fruit growing. For instance, in the business world, large sums of money are made, because one man devotes himself to one particular thing. A successful business man is Andrew Carnegie. He says, "Not to put all your eggs into the one basket, but if you put them in watch them."

It is a common thing to find our vegetable growers also growing small fruit. I believe that the proposition to change the name of this Association so as to include all small fruit growers is a good one. Are they behind the times ? Let us consider the question in a general way.

A man's farm or garden is not only the place where he makes his living, but also where he lives and his family also. A variety of crops certainly adds to the pleasure of living, if he can have on his table the early strawberries and the late blackberries. Fresh fruit is always delicious. We men love our families, but we are inclined to neglect the crops that can be produced for our table. If we make them so as to derive a revenue from them, we are more apt to take care of them.

In the second place, the products of the garden are apt to be hurt by the weather, and the prices fluctuate considerably. If one crop is bad or the price is low some other helps to make up the income for the family. That is another reason why it is sometimes desirable for a gardener to grow small fruit. Then, again, for this reason, berries are a perishable crop, and if they could be got to the consumer in a fresh condition more would be used.

When Isaac Walton wondered why the Almighty did not make a better strawberry than He did, he was thinking of the berries as seen in the stores. Other things being equal, berries grown locally are more easily placed in the hands of the consumer, and if they are to be grown locally, there is no one better fitted to grow them than the vegetable grower. In the first place, he has the land, and in the second place, he is continually hauling supplies of fresh vegetables into the town, and if he had berries on his load, they would, probably, oftentimes, help him to sell his vegetables. In many cases they would work in very nicely.

I believe in cutting out the transportation man and the middleman, for the grower first and then for the public. I think one of the things which concern the grower all over the country is to try to manage his business himself, and get as large a proportion of his produce to the consumer direct as he possibly can. If those who produce the food of the people could get the larger proportion of the returns direct, it would undoubtedly be better for the community. Our farmers would live better, educate their children better, improve their homes, and this is all most desirable.

I am not denouncing transportation companies or middlemen. It is a fortunate thing that we can draw on the products produced all over the civilized world.

Thanks to transportation we can eat pineapple and grape fruit. We like to have these things and it adds to life to have them. Notwithstanding this, I think it well to have more things supplied to the local markets by local producers. Cut out the transportation charges and the middleman's profit. For instance, over in St. Catharines, if we shipped our potatoes and they got into open competition with the other markets, we would have to drop the crop altogether. We could not grow for the general market, but we manage to do well for our local market, because we get the outside price. All over the country, many crops might be locally produced in this way. The consumer would pay no more than he would for imported potatoes, but all the money would be in your hands. I can give you an example of what I mean. Mr. Macoun told me that potatoes at Ottawa retail at fifty cents a bag. I have not sold any at less than sixty. The growers sell at fifty cents. You notice that I have been speaking of local or personal markets. It may be that a section after supplying its local markets, is in a good enough position to compete with the big shipping sections.

About the individual side of it, no man can tell in an off-hand way whether he ought to grow small fruit with vegetables or not. I would say do not attempt to do more than you can do thoroughly. If you succeed, follow it up. It may require attention when you are particularly busy with other crops, and you may lose more than you will gain. However, try it in a small way. You will soon work out a scheme of crops that will fit in with your labour. There is not time to take them up individually.

Strawberries work in well with vegetable growing. You plant them out in the spring, and you take a crop off the following year, besides a crop of something between the rows. You can keep them over another year, but of course the crop will not be so heavy. Then you can plow them under and the ground is in excellent shape for potatoes. Strawberries work into any rotation. Bush plots require longer, and would take out of your rotation a plot of ground.

Our people in St. Catharines think there is more money in raspberries than strawberries. They have one or two nice raspberry growers who are planting their beds four feet by eight feet. It is surprising the heavy crops taken off of these. It is very successful indeed. They do not leave too many stalks in the hill. They consider one strong one preferable to a lot of weak ones. On account of the distance apart, we plant another crop which depends on the way we feed the crops and the amount of moisture. There is a danger of beginners getting them too close for the best results.

Blackberries have a great future if grown in this local way for a personal market. I used to wonder how anyone ate blackberries raw for they used to set my teeth on edge. I commenced to grow them, and had someone pick them who knew the difference between the pitch black ones and red ones, and with sugar and cream they are delicious.

The dewberry, the finest of any of this class, was grown by a neighbour of mine. They were immense and delicious in quality, and he found them very profitable indeed. I believe they are very tender. They have to be supported on wires. I do not know whether they could be grown on the north side of the lake or not.

H. S. Peart.—They are grown at Oakville.

W. A. McCalla.—Gooseberries are packed green and are used for pies. American gooseberries are not a high class fruit, but the English varieties are very fine, indeed. A lime and sulphur spray holds the mildew on the English fruit in check. The quality of these is so much better either for eating, making jam or pies. They should have a great future.

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J. W. Rush.—Are those English gooseberries as easy to propagate as the others ?

Mr. McCalla.—No. Are you growing them now, Mr. Rush?

J. W. Rush.—Yes.

J. Lockie Wilson.—I am very much pleased indeed with the splendid address given by Mr. McCalla. While it has been suggested that we should change the name of the Association, and while there is no harm in our vegetable growers producing small or large fruit, still, I think it a mistake for our Association to change its name. We had better confine ourselves to one line of business. I would strongly suggest and hope that our name will remain unchanged.

ADDRESS.

GEO. A. PUTMAN.

It affords me great pleasure to say a few words to the Vegetable Growers' Association, one of the active societies in Ontario. It was organized some four or five years ago, but no one thought it would have grown to the proportions seen here to-night. I want to congratulate you for the splendid work done.

You have a great many taking an active interest in your work, but one of your problems is how you can reach the man who will not take an interest in your meetings, in your convention, as well as those held locally. This is, indeed, a problem. It occurred to me when listening to some of the addresses here to-night that the Vegetable Growers are doing a very good work educating the people as to the importance of the vegetables and small fruit which they grow. The city people do not appreciate the value of small fruit.

There is another Association in Ontario, formed at a later date than the Vegetable Growers, that is the Women's Institutes, with 530 societies and a large membership. We have done a great deal through this to impress upon the farmers, their wives and the village people the value of vegetables. Generally speaking, the farmer who can grow these so easily and with little effort, does not grow many, but if the woman of the farm is interested in them there is a vast improvement. A great deal is done for vegetables through the Women's Institutes. Like doctors, the farmers will not use their own medicine, and it is the women who make use of them. There would be twice the number here to-night if people appreciated the value of vegetables.

INSECTS THAT AFFECT MARKET GARDENS.

C. W. NASH, TORONTO.

The first record of the elm tree scale was in 1907, and since then it has spread all over Toronto. It is an injurious pest, and next to the San Jose scale, the worst known. You, as vegetable growers, have any amount of trouble from insects. In fact, you say, "What would the fruit growers do if they had as many as we have?" Our troubles, unfortunately, are always worse than the other fellow's. However, you are constantly working in and about your plants, and you notice very early if anything is being injured. For instance, a lively cut worm in a row of vegetables, when the plants are small, during the night, will destroy twelve or

eighteen inches. You see this, but a farmer looking out over a growing field may lose thousands of plants without knowing anything about it until the crop is reaped.

The worst class of insect pests that the farmers or vegetable growers have to contend with, are those beneath the ground surface. They either eat the roots or cut off the plant just above the ground, and then pass on to the next one. The cutworm you know very well indeed. This cutworm is produced by eggs laid by a moth. They deposit their eggs about the stems of the plants, weeds or any standing plant. As soon as they do this, they go down into the ground and feed. In the autumn we do not notice their ravages. They winter just below the frost line. About the middle of June the whole class passes through the larva state, then pupates and becomes moths.

Then there is the white grub. That is produced from the eggs laid by the common June beetle. These eggs are deposited late in June, and that larva stays in the ground for two years. I have found them coming up to the surface, but they, as a rule, feed on the roots of the plant and it dies.

Then there is the long yellowish-brown Rose Beetle, a bad one, which feeds on almost anything. For three or four years it was very numerous around Toronto, but you very seldom find the larva now.

Then there is the larva of the striped cucumber beetle. These are troublesome pests. It is rather a difficult proposition to deal with this larva, because it is under ground and you cannot apply poison. There is just one way that you can get rid of them, and that is, when you find their haunts, drive holes into the ground, and into each of these holes pour bisulphide of carbon. It will work through the soil, and it is death to any form of insect life. Do not put it too near your plants. Have your holes four or five inches apart.

With regard to the cutworm, you can keep them under control by a simple device, using the sweetened bran poison. Take a quantity of bran and mix it with a little molasses and water, and to fifty parts of that put one part of Paris Green. You use that by dropping it in little lumps all along the rows of the infested bed. Strange to say, they prefer it to green growing vegetables. They will eat it and die.

Passing from the insects which live underneath the surface of the ground, the thrip and stem borer are two very injurious ones, the larva of both almost belong to the same genus. Some day, you may find a plant gone entirely or the branches on it, for instance, dahlias, potatoes, tomatoes. This stem borer destroys them. If you notice in some of the branches, some height above the ground a small hole, watch out for trouble. Through that hole the young larva has entered. When the larva is very small, it burrows its way through the stem and works downward. Very frequently a man has a bunch of stems destroyed in this way and he does not know what has done it, and he will cut off the stem, and leave the insect in the plant to do its work. You cannot get rid of that insect on a large scale. If you want to, when you notice these holes, you can put in a little bi-carbonate of soda. I had a good many fancy Aquilegia, and they took every one I had, and left me the common purple one. Those are the only stem borers.

There is a herd of other insects that attack the foliage. I can only go over them in this way. I shall classify them into two groups, suctorial insects and biting ones. The suctorial insects are the worst ones. There is the odoriferous squash bug.

In dealing with suctorial insects, it is necessary to get an irritant on their bodies. They breathe through the sides of their bodies, and you cannot get at them. I very often have had trouble about this, and doubtless farmers, fruit growers, and vegetable growers have had also. Spraying is no good whatever. I had any number of bugs.

and I sprayed them with Paris Green, and they got fat on it. You feed the common green plant lice with Paris Green, and they are of the same group. You are doing them a kindness in painting them with Paris Green. You must get after their bodies in some fashion or other. These insects breathe through spiracles in their sides, and if you can close these, they die. The commonest thing to use is common soap, and they have a greater objection to this than the school boy. Soap on the school boy improves his appearance, but in the case of these insects a slight film of soap going over their bodies closes the spiracles and they must die.

There are all sorts of emulsions used for these. At one time poison emulsions were largely recommended. Many think it best to use a mineral oil, but if you continue using that, you will injure the vegetable fibre. A great many people cannot deal with this question, because they have no knowledge of Biology. There are many objections to the use of this oil. The remedy recommended is worse than the disease. The mineral oil does not act favourably on the vegetable tissue. Take any soap at all. One pound to two gallons of water will kill any insect. If you do not use seal oil soap, use any soft soap, but if you use soft soap double the quantity, that is, two pounds of soap to two gallons of water.

Another class of pests is the larva of the cabbage fly and the onion fly. Work around the cabbage, stirring the ground and watering thoroughly with a pump or hose, and get this soap so that it will be around the roots of the plant.

There is the radish fly. Dust the plants over with wood ashes, and the fly will not lay its eggs on the leaves or stem with the dust there. The soap mixture is just as good, however.

The other insects comprise all sorts of families. They are the insects which feed with jaws, the potato beetle, the caterpillar. There are a lot of cabbages and cauliflowers for them to burrow through and eat. Then there is the larva of the common white butterfly. There are several ways by which these are got rid of. There are one or two important ones I should like to mention. The climbing cutworm burrows into tomatoes, corn and other plants, then the large green caterpillar. Hand picking will enable you to get rid of the latter. There are a large number of beetles and caterpillars.

You might spray these with arsenic, and the best form is arsenate of lead. This sticks well, and can be used in large quantities without any danger of burning the foliage of the plant. You cannot do that with Paris Green. Arsenate of lead is not so effective as that. Use two pounds to fifty gallons of water, and this is applicable to all cases. Some people are prejudiced against eating, handling or selling vegetables with arsenic poison on them. However, in the case of the cabbage, the arsenic is only on the outside leaves. If you have any objection to that for killing the caterpillars and the cabbage aphis, kill those by using any mixture of pyrethrum.

You will find if the mixture of soap is thoroughly applied to any plant, that it will rid it of these insect pests. There is another thing vegetable men ought to bear in mind, and that is that potash in any form is one of the best stimulants. Potash is used largely in the composition of soap, and therefore, it is a fertilizer and valuable stimulant.

R. J. Bushnell.—There is a slug called a wire worm.

C. W. Nash.—A seed bed looks a sorry thing in the morning if they are in it. It is a big slimy creature. Dust over the ground either at night when they are feeding or in the morning with salt or quicklime. Salt in a small quantity is a stimulant. You should be careful if you use it. Lime is safe. You will cure many things in the soil by using this. It is not used enough in this country.

VEGETABLE SEED INVESTIGATIONS.

E. B. Eddy, Ottawa.

I would like to refer briefly to the work being done by the Seed Branch in investigating the germination qualities of the field root and garden seeds sold on the Canadian market. This work, which has been carried on for three years, was started with a view to determine to what extent the claim that vegetable seeds of low vitality were being sold in Canada was justified, and to collect data for the purpose of framing a satisfactory amendment to the Seed Control Act regulating the seed trade in respect to vitality. During the last three years samples have been collected from all parts of the Dominion by seed inspectors and sent to the Ottawa seed laboratory, where they have been tested for germination. Some of these seeds were taken from bulk lots but most of them were papered goods, as it is generally in the latter class that the poorest quality is found. A summary of the results with some of the principal kinds of seeds tested is given on the chart. The first column of figures represents the number of samples of the different kinds of seeds tested during the past three years. The second column gives the average germination of the samples tested, the third column the standard germination recognized for good seed of the various kinds, and the last column the percentage of samples below two-thirds the standard germination.

Results of Vegetable Seed Investigation.

Kind of Seed.	Number Samples Tested.	Average Germination.	Standard Germination.	% below ⅔ Standard.
Beans	140	78	90	16
Peas	141	80	97	17
Cabbage	270	75	93	14
Raddish	300	85	95	9
Carrot	299	60	80	36
Turnip	275	80	95	13
Parsley	43	51	65	30
Cucumber	235	82	90	3
Musk Melon	48	84	90	2
Watermelon	60	75	90	13
Squash	87	73	90	22
Pumpkin	62	81	90	10
Citron	30	79	92	10
Onion	243	67	90	29
Tomato	141	79	90	13
Parsnip	118	44	65	38
Salsify	39	60	85	46
Cauliflower	85	79	90	7
Field Corn	122	89	95	5
Sweet Corn	164	79	95	17
Spinach	55	48	90	73
Lettuce	235	90	90	6
Pepper	32	42	70	53
Leek	25	51	90	68
Beet	249	146	160	13
Mangel	113	148	160	15

Speaking generally, it may be said that the seedsmen of Canada are supplying vegetable seeds of good vitality, but a glance at the fourth column of the table will show that there is still considerable low grade seed being sold. In fairness to our most reliable seedsmen, it should be stated that the fourth column is made considerably larger than it otherwise would be by the samples from a few wholesale dealers who appear to make a practice of sending out cheap seeds of low vitality, so that the average of the samples from the more reliable dealers is considerably higher than the general average here given.

Effect of the Amendment on the Vegetable Seed Trade.

The amendment to the Seed Control Act will make it illegal to sell seeds of any kind, the vitality of which is not up to at least two-thirds the standard recognized for good seed, unless the percentage germination is marked on every bag or package containing such seed. The fourth column of the chart will indicate the extent to which the trade in vegetable seeds will be affected. The standard of germination for cereals, timothy and clover seed is 95 per cent., so that the minimum percentage germination for seeds in these classes will be 64 per cent.

To Raise the Standard and Prevent Loss through Low Vitality.

But while the trade in vegetable and field root seeds is on a fairly satisfactory basis so far as vitality is concerned, even the most careful seedsmen are always in danger of being supplied with comparatively poor seed, through unfavourable weather conditions during the ripening period, or some other cause, and the purchaser should safeguard himself against the possibility of partial crop failure through sowing seed of low vitality. Many farmers have found by experience that heavy losses have been sustained in this way and it is best to use every precaution to prevent them.

The quality of the field root and vegetable seeds sold in Canada could be considerably improved if the farmers would insist upon having, and be willing to pay for, the best obtainable stock. Practically all of our stock is imported, but we do not get the best seed, which is that grown by specialists under inspection, because our seedsmen claim that they can not get purchasers for this high class seed in competition with inferior stock grown by farmers without responsible inspection, which of course can be sold at a much lower price. It is therefore possible for us to obtain goods of a much higher standard, not only in regard to vitality but also trueness to type, if we could get our seedsmen to understand that we want seeds of the first quality and are willing to pay for them. This should be the first step toward general improvement in the trade. Then every farmer or market gardener should protect himself against possible loss by purchasing his seeds early and testing them for vitality before sowing. This can easily be done by making tests at home in a box of earth or between pieces of moistened blotting paper or flannel cloth, keeping the seeds at the temperature of an ordinary living room. This will give approximate results, or you can have the tests made in the seed laboratory, Ottawa, free of charge.

Summary.

We have noted some of the dangers in purchasing seeds of the various sorts, and I would like to again emphasize the following points to be observed in guarding against them:—

1. Place your orders early and have your dealer's guarantee verified by having a sample of the seed tested, so that you may know exactly the nature and quantity of the impurities.

2. With root and vegetable seeds, purchase from the most reliable dealers and insist on securing the best quality of seed obtainable.

3. Secure the seed early and have it tested for vitality before seeding.

STANDARD WEIGHTS OF VEGETABLES.

The following are the standard weights per bag of vegetables as proposed by the Ontario Vegetable Growers' Association, for which legislation is being sought:

Parsnips	45	pounds to the bushel.
Carrots	50	" " "
Beets	50	" " "
Artichokes	56	" " "
Potatoes	75	" " bag.

It may be interesting to compare the standard weights of vegetables per bushel as adopted in the different States of the Union, which are as follows:

——	Beets.	Carrots.	Onions.	Parsnips.	Tomatoes.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
California			57		
Connecticut	60	50	57	45	
Georgia			56		
Illinois			57		
Indiana			48	55	
Iowa			57		
Kentucky			57		
Kansas			57		
Massachusetts		50	52		
Maine	60	50	52	45	
Michigan			54		
Minnesota	50	45	52	42	
Missouri		50	57	44	45
Mississippi			57		
Montana	50	50	57	50	
Nebraska			57		
North Dakota	60		52		
New Jersey			57		
New York		50	57		
Ohio	56	50	55		56
Oklahoma	60				
Pennsylvania			50		
Rhode Island	50	50	50	50	56
South Dakota	60		52		
Tennessee	50	50	56	50	56
Texas			57		55
Virginia			57		
Vermont	60	50	52		
Wisconsin	50	50	57	44	

Standard weights of vegetables set by one or two States in pounds per bushel:

Green Unshelled Beans—Missouri and Tennessee, 30 pounds.					
Cucumbers	"	"	48	"	Wisconsin 50 pounds.
Horse Radish	"	"	50	"	
Kale	"	"	30	"	
Cabbage	"	"	50	"	
Rhubarb	"	"	50	"	
Sage	"	"	4	"	
Salads	"	"	30	"	
Spinach	"	"	30	"	

REPORT OF INVESTIGATION OF CABBAGE AND CAULIFLOWER GROWING IN CANADA AND THE UNITED STATES.

By A. McMeans, O.A.C., Guelph.

Late in the month of July, 1909, the Executive of the Ontario Vegetable Growers' Association requested the Department of Agriculture to have an investigation made of the cabbage and cauliflower industry.

I was entrusted to do this work and was authorized to visit some of the principal cabbage-producing States to gather information and enquire into the methods used by the leading growers. During the month of August the States of Michigan, Wisconsin, Illinois, and Ohio were visited, and early in the month of November some of the cabbage-storing sections of New York State and the cauliflower district of Long Island.

CABBAGE.

Origin and History.

On the sea coasts of England and other countries of Western Europe, from Norway down to the northern shores of the Mediterranean, may be found the wild cabbage, *Brassica oleracea*. The cabbage in its wild state is entirely destitute of a head but has a rather succulent stem and leaves. Botanists tell us that from this wild plant originated not only all our varieties of cultivated cabbage, but also all forms of Kale, Kohl-rabi, Brussels sprouts, Brocoli and Cauliflower. No more wonderful example than this exists of the changes in a plant by cultivation. The improvement of the wild cabbage began, probably, some three or four thousand years ago. The Jews and Egyptians cultivated it and it is interwoven with the mythology of the Greeks. There seems to be no doubt, however, that the greater part of the development of the cabbage as we at present know it, took place within the past two hundred years. The origin of it is, however, of minor importance compared with the knowledge of its cultivation.

Status of the Industry in Ontario.

There is no information available regarding the extent of the cabbage industry of this Province. In a Departmental Report for 1908, the statement is made that 4,900 crates or bushel baskets of cabbage were shipped from the Leamington district that season; of this amount fully one-half were express shipments.

In conversation with several leading commission merchants regarding shipments of storage cabbage into this Province, it was estimated that they ranged from forty to fifty cars yearly. In the past, storage cabbage have been brought in from New York State and the Province of New Brunswick, and, the present season, cabbage is being shipped in from the Province of Quebec, which cost laid down in Toronto a trifle less than $20.00 per ton..

Markets and How Supplied.

Our early markets are supplied with cabbage grown in the Southern States; these are chiefly of the Wakefield type and are usually shipped in crates. The standard crate is of the following dimensions: Heads and centre piece 11 x 20 inches, the side slats and top and bottom pieces are 40 inches long. The crate holds from two to four dozen cabbage, depending upon the size of same.

A Standard Cabbage Crate.

This southern grown stock supplies the markets of this Province with new cabbage from February until about July the first, when shipments of domestic cabbage from the Leamington district make their appearance in the market. The cabbage from this section is usually shipped in ventilated bushel baskets, and small slatted crates holding not over one and one-half bushels. The industry in this section is not yet of sufficient extent to warrant the shipment of car lots.

From July on, the home markets are supplied by the growers living in the vicinity of towns and cities, and this source can generally be depended upon to meet the demand until March or April. Should the price of storage stock in the United States be low, then can be seen the strange spectacle of American grown cabbage of the Danish type competing against fresh Southern stock on the Ontario markets.

As yet in this Province the cabbage industry has not passed the stage when each grower either stores or pits his own crop.

Types.

There are three distinct types of cabbage with reference to the shape of the head, oval or pointed, round, and flat. There are also three distinct classes, white or domestic, savoy and red. Some varieties are distinct in type while others partake of two or more shapes due to crossing. There is variation also in the shape, character and texture of the leaf, from regular straight edges, to irregular almost fringed edges, and from smooth and tender to coarse and tough. There is also some variation in hardiness. Usually the purplish-green varieties with crinkled leaves are hardier than the whitish-green sorts with smooth leaves.

Ontario Methods.

Growing Early Cabbage.

The seed is sown either in hot beds or greenhouses during the month of February or very early in March, using Early Jersey Wakefield or a variety of that type. Shortly after the true leaf makes its appearance they are transplanted into flats; as soon as they begin to crowd they are again transplanted into other flats, this time about three inches apart. Shortly after the second transplanting the flats are removed to cold frames or hot-beds. Where hot-beds are used they are either "spent" beds, that is hot beds which have exhausted most of the heat which was in the manure (by having had a previous crop), or else hot-beds in which manure to the depth of six to nine inches is used. By using this small amount of manure as heating material, the bed is kept much cooler, and, as a consequence, the plant becomes gradually hardened and thus stands the check of transplanting to the field. This is also helped greatly by leaving the sash off the beds during the day, covering them only on cold nights. While there is no doubt that the above is one of the best methods, the one practised by most growers is as follows: The seed is sown in the hot-bed rather thinly, and the plants left to grow along, gradually hardening them by removing the sash, or transplanting them directly from the seed bed to the cold frame. The varieties grown which are started in this manner are Early Jersey Wakefield as the earliest, followed by one of the Early Summer type as second early.

Soil.

Any good garden or farm soil that will grow a good crop of corn will produce a good crop of cabbage. For early cabbage a warm or well-drained sandy or sandy loam is preferable, and as the cabbage plant is a gross feeder it is almost impossible to have too much plant food in the soil. Barnyard manure, from twenty to fifty tons per acre, is generally applied and quite often this is supplemented with commercial fertilizers. In growing early cabbage it is necessary to bring the plant along to marketable condition quickly, so as to catch the high market price, and one of the chief aids in doing this is by having more plant food in an available condition in the soil than the plant can use. It is preferable to have the soil fall plowed, plowing again early in the spring and working it up to a nice tilth.

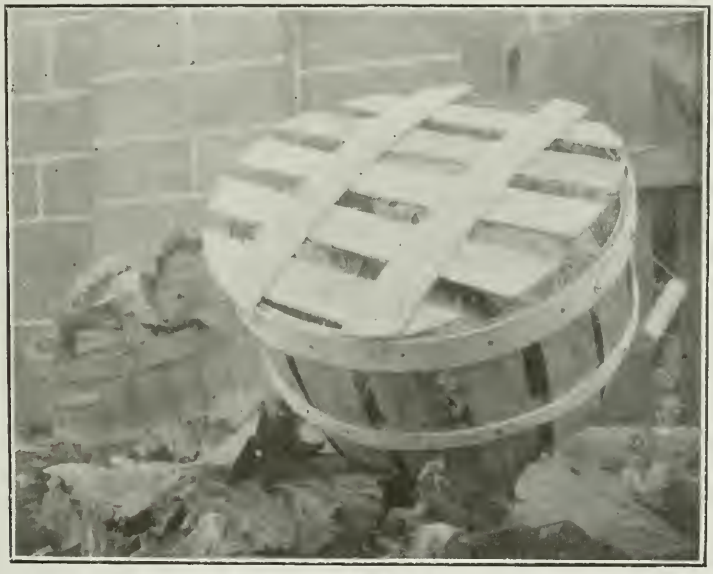
Planting.

The plants are transplanted to the field, as early as possible, and at the same time it is desirable to secure as favourable weather conditions as possible, which is a soft moist air from the south or east.

Wakefield varieties are usually planted in rows twenty-eight or thirty inches apart and the plants sixteen to eighteen inches apart in the row; Early Summer and All Head varieties in rows thirty to thirty-two inches apart and plants twenty to twenty-two inches apart. This admits of horse cultivation one way and at the same time gives the plant plenty of room to develop.

In planting, it is necessary that the work be done well, and for this purpose a "dibber" is used. The planter makes a hole in the soil with the dibber held in his right hand. With the left hand holding a cabbage plant, he thrusts the roots of the plant in the hole previously made. The soil is then firmly pressed against the roots of the plant by means of the dibber. This work can be done very quickly by anyone who is experienced in the use of this tool.

A good test as to whether the plant is properly set or not is to take hold of the edge of one of the leaves and if the leaf tears away the plant is properly set.



Ventilated Basket used in Leamington District.

If, however, the plant pulls out of the soil, it will be necessary for the planter to see that the soil is pressed more firmly against the root of the plant than he has been doing.

Cultivation.

This should start in almost at once, it being as necessary to the life of the plant as it is to kill weeds. The general practice is to cultivate at least once a week and rather deeply at the start, gradually working shallower each time of cultivation. The hand hoe is generally used at least twice between the plants in the row, and cultivation is kept up until it is impossible to get either the horse or cultivator between the plants without damage to them.

In cutting early cabbage for market, a few more of the outside leaves are left on than is the case with later varieties.

Late Cabbage.

The late cabbage crop as grown by the vegetable grower of this Province is generally a second crop, spinach, peas, or some other early crop having occupied the soil for a time previous to the plowing and fitting of the soil for the cabbage crop. The soil for late cabbage should be much the same as for early, but what is really preferred is a well worked loam with a cool retentive subsoil. Careful preparation of the soil for this or any other crop is generally well repaid by the resulting crop.

Seed and Growing the Plants.

The production of plants for the late crop is quite different from that of the early one. For this purpose, a strip of land is chosen in the spring, is put into good shape with the aid of a plow and harrow, then floated or rolled, and seed sown in rows which are spaced about one foot apart. Although one ounce of cabbage seed will contain close to eight thousand seeds, the average grower is satisfied if he gets two thousand good plants per ounce of seed used, thus taking about four ounces of seed to produce plants for an acre of cabbage. The seed can be sown by any of the seed drills on the market and should be sown rather thinly, say one ounce to four or five hundred feet of row. It is the practice of some growers to select a rather poor piece of soil for the seed bed, the idea being that plants grown on a poorer soil are usually more tough and wiry than those grown on richer soil, and thus bear the shock of transplanting better than the green, soft, succulent plant. The date of sowing seed for the late crop will vary from the first to the twentieth of May, for the different parts of the Province. After the plants break through the soil they should be hoed or wheel-hoed to keep down weeds, help growth and conserve soil moisture.

In five or six weeks after sowing the seed, the plants should be ready for setting out in the field.

Planting.

If the field has been kept well cultivated or thoroughly worked and plowed freshly, the chances are that the soil will be moist enough for planting without going to the extra trouble of watering. A good rule to go by is to insert the "dibber" in the soil, withdraw it, and if it leaves the hole clean and open, without filling it with dry dirt, the soil is or should be sufficiently moist for setting plants without the use of water, in weather that is favourable. The distance apart at which the plants are set will vary with the soil and condition of the same and land value. With most of our growers living close to towns and cities, where land values are high, the distance apart is generally rows thirty-two inches and plants twenty to twenty-two inches apart. This will vary up to rows three feet or more apart, and plants two feet and upwards apart.

It is the practice of a few growers in this Province to sow the seed where the plant is to mature. For this purpose a hill-dropping drill is used and three or four seeds dropped in a hill. After the seeds germinate and make nice sized plants, the extra ones are thinned out. This method requires more seed per acre, and while it saves the labour incidental to transplanting, it also necessitates that the land on which the crop is to be grown by this method be what is known as clean

land; otherwise, the extra labour required to keep the land clean would overbalance the cost of transplanting. As for the crop, where carefully tended to in either case there is no marked difference.

Cultivation should be kept up the same as for early varieties.

Varieties Grown.

These are largely All Head, All Seasons, and Flat Dutch for fall use and a short period of storage, say up to Christmas; Danish Ball Head and Hollander for storage and supplying the markets from the last of October until the supply is exhausted in the spring.

Types of "Dibbers."

Storage.

The methods of storage in this Province are as yet in the hands of the grower and vary very much even in the same district. Some growers have small storage houses for their vegetables and store their supply of cabbages on shelves, others store in narrow bins, in barn basements. These bins are about two feet in width with narrow air spaces between them and the cabbages are piled some five or six feet deep. In the past, sufficient care has not been taken to get a good circulation of air through and around these deep but narrow bins, with the result that the loss by rot was of undue proportion. I was in a large barn basement this fall where upwards of fifty tons of cabbage were stored in long A-shaped piles. These were about three and a half feet wide at the bottom, about four feet high and twenty feet in length. The cabbage in these piles had the rough outside leaves trimmed off, but some six or eight inches of the stump were left on, the grower thinking that the shrinkage was not so heavy and that the head would draw some sustenance

from this extra portion of the stump, also that the A-shaped pile of cabbage would allow of better circulation of air, the extra portion of stump not allowing the cabbage to lie so close together. Other growers resort to pitting their supply of late cabbage for storage. This involves an extra lot of labour both in storing and again in taking them out of the pits to prepare them for market. At best it is but a makeshift and not to be recommended. In pitting cabbage two methods are chiefly used, so a brief description of each may be of use.

The A-Shaped Pit.

To pit cabbage by this method a piece of ground is chosen that is either well drained or slightly higher than the surrounding ground; this is for the purpose of getting dry location. It is levelled off some three or four feet in width and of a length sufficient to hold 150 or 200 heads of cabbage. The cabbages are placed on the portion of ground thus levelled off, starting at one end and placing three heads in width, folding their heavy outside leaves under them as much as possible. On top of these three cabbage are placed two others, folding the leaves of that part of the head that is placed on the inside of the pit under the head proper, allowing the outside half of the leaves to fall down over the outside of the lower head. On top of these two is placed another cabbage, the outside leaves of which are allowed to fall down over the two heads beneath it. This is continued until your pit is twenty-five or thirty heads in length, and when cabbage are placed properly the outside leaves form a sort of thatch roof which will shed rain or snow from this long A-shaped pile. These pits should run north and south in preference to east and west for the following reason: should we get a period of warm weather the long south side of the pit would warm up too much, and, in all probability, rot and decay would take place. This is avoided when the pit runs north and south as both sides of the pit get almost an equal amount of heat from the sun. It is preferable to make a number of these pits, holding from 100 to 200 cabbages, instead of one long one. These are usually covered lightly with straw, and then with three or four inches of soil beginning at the bottom and working up. Care should be exercised so as not to pack the soil when covering the pit, as by so doing the frost will enter more readily. When the weather gets sufficiently cold, coarse litter or manure can be added. To keep the cabbage cool without freezing is the desired aim.

The Long Trench Pit.

This is another method in general use and is made as follows: Plow out a furrow and place the cabbage, head down, along it, folding the loose outside leaves under the head as much as possible. A light covering of straw is placed over this row. The plow is then run along both sides of the row, throwing the furrow on and over the cabbage. This is supplemented with a man and a shovel to see that every part is properly covered.

A big objection to pitting cabbage is that considerable loss is often found just at the junction of the root and head. The cause ascribed is that the root or stump protruding from the top of the ridge or pit allows winter rains and thaws to enter and settle around this point, thus leading to decay.

The method in general use in cutting cabbage for pitting, is to use a sharp spade and a quick, strong, swinging drive, aiming the blade of the spade at a point on the stump two or three inches above the soil, causes a sliding, driving cut that will surprise the beginner how fast cabbage can be cut by using this method.

A Field of All Head Cabbage.

Analysis and Composition of the Cabbage.

This extract is taken from Bulletin No. 133, Maryland Agricultural Experiment Station, and is work done by H. J. Patterson in 1893. The samples represented a number of average mature plants, or plants with the heads in the best condition for market.

Dry Matter and Principal Mineral Constituents of Different Parts of the Mature Cabbage Plant.

Components.	Heads per cent.	Refuse, leaves and stalk. per cent.	Root per cent.
Water	98.50	91.02	83.29
Dry matter	1.50	8.98	16.71
Total	100.00	100.00	100.00
Organic matter	1.29	5.40	14.21
Mineral matter	0.21	3.58	2.50
Dry matter	1.50	9.90	16.71
Pure ash	0.20	1.58	1.53
Sand	0.01	2.00	0.97
Crude ash	0.21	3.58	2.50
Lime (CaO)	0.019	0.441	0.107
Magnesia (MgO)	0.005	0.060	0.057
Phosphoric acid	0.023	0.080	0.111
Potash (K_2O)	0.087	0.402	0.762
Soda (Na_2O)	0.001	0.052	0.082
Iron and Aluminum	0.031	0.021	0.025
Chlorine	0.010	0.018	0.075
Sulphur (SO_3)	0.056	0.035	0.030
Sand	0.010	2.000	0.97

Food Constituents in Heads and Refuse Cabbage.

	Heads per cent.	Refuse matter per cent.
Water	98.50	91.02
Ash	0.21	3.58
Protein	0.41	1.42
Crude fibre	0.38	1.32
Nitrogen-free extract	0.46	2.41
Fat	0.04	0.25
Total	100.00	100.00

These results would indicate that cabbage is a very watery food and contains very little dry matter, but that the relative amount of protein in the dry matter would class it as relatively more nutritious than is usually recognized. The results in the above tables show the different fertilizing elements found in the various parts of the cabbage plants to be as follows:

Fertilizing Material Found in the Different Parts of Cabbage Plants.

(Per cent. in fresh material.)

	Heads. Per cent.	Refuse leaves. Per cent.	Root. Per cent.
Phosphoric Acid	0.023	0.080	0.111
Potash	0.087	0.402	0.762
Nitrogen	0.065	0.227	0.352
Lime	0.019	0.441	0.107

An average crop of cabbage will yield per acre, say, 6,750 mature heads weighing three and a half pounds each, or 23,625 pounds. This will easily allow for ten per cent. or 750 immature heads. These, together with the refuse matter from the 6,750 mature heads, will average about two pounds each, or 15,000 pounds. The 7,500 roots, averaging one-quarter pound each, will make 1,875 pounds. Figuring on this basis, with the above amounts of fertilizing material, we find the following:

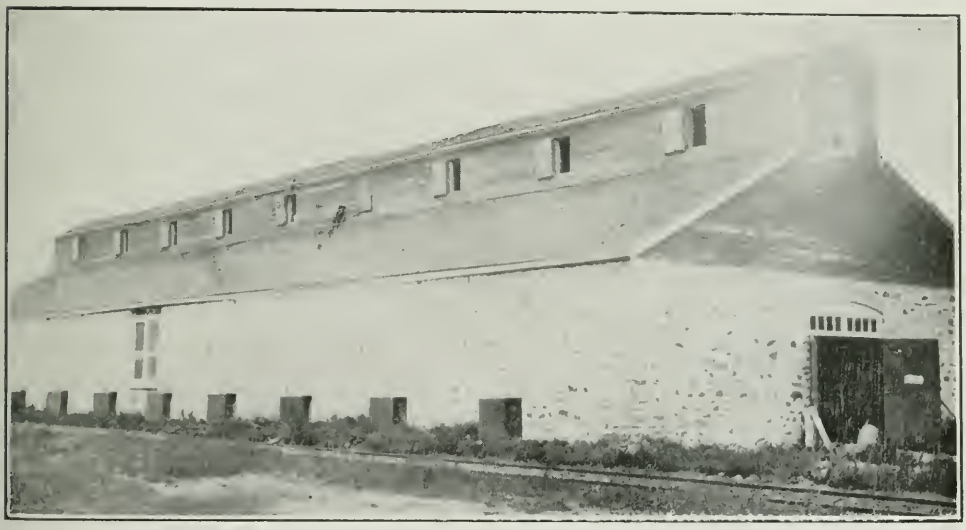
Pounds of Fertilizer Found in Cabbage from One Acre.

	Heads. Pounds.	Refuse. Pounds.	Roots. Pounds.	Total Pounds.
Phosphoric acid	5.43	12 00	2.08	19.51
Potash	20.55	60.30	14.28	95.13
Nitrogen	15.35	34.05	6.60	56.00

Varieties.

The use of descriptive words or phrases given to variety names confuses the grower. Often times these descriptive words or phrases mark no real variety difference. As an example may be cited the Jersey Wakefield cabbage. The following descriptive words or phrases are used by different seedsmen to distinguish their stocks: Our Own Jersey Wakefield, Extra Choice Jersey Wakefield, Pedigree Jersey Wakefield, Improved Jersey Wakefield, Extra Select Jersey Wakefield, Select Very Early Jersey Wakefield, Special Stock Jersey Wakefield, etc., as well as the addition of the seedsmen's firm name, as per example, Maule's Prize Wakefield, Vaughan's Selected Early Jersey Wakefield, etc. Sometimes these descriptions mark real superiority of stock, but the practice of usage of the above has been so much abused as to have little or no significance.

The time is fully ripe for the American Seed Trade Association to take steps to simplify the variety names of vegetables. This can be largely done by elimin-



Storage House at Shiocton, Wis.

ating descriptive words or phrases and firm names, as well as the use of such synonyms as are well known. In the Yearbook of the Department of Agriculture of the United States for 1900, it is stated that American seedsmen catalogued "685 real or nominal varieties of cabbage.' So for the above reason I am not going to take up space describing varieties. Suffice to say, study the catalogues of good reliable seed houses, study the varieties that do best in your locality, and this can easily be done by mingling with your fellow growers, try, and test, in a very limited way, new varieties, and adopt them when they show marked superiority.

American Methods.

The latest authentic information obtainable from the United States Department of Agriculture, Bureau of Statistics, relating to the extent of the cabbage industry in that country is the twelfth census concerning the crop of 1899. Al-

though these figures are somewhat old, they may be of value in showing the extent of the industry ten years ago in the States:

State.	*Acreage.*
New York	25,261
Illinois	7,082
Ohio	6,970
Wisconsin	4,400
Michigan	4,028

A total of 150,156 acres was devoted to cabbage production in the United States.

The total imports of cabbage into the United States from all countries, 1904 to 1908, were as follows:

Year.	No of Heads.	Value (a).
1904	1,313,707	$70,328
1905	8,729	589
1906	66,260	4,336
1907	5,808	390
1908	8,073	584

(a) Average value at foreign ports whence imported.

A farm crop report is issued by the State Board of Agriculture of Wisconsin, and from it and the Secretary of the Board, I gathered that the average acreage for the past three years was approximately 5,000 acres and has not materially changed in the past five or six years. The average yield per acre for 1909 is given as twelve tons, the quality is given at 90 per cent., and the average price $5.75 per ton.

In dealing with the cabbage crop of the Northern States, it will be found to be on a much different basis to what an Ontario grower would expect. This is apparently caused by a sort of reciprocity between the Northern and Southern States as regards cabbage growing. As is well known, cabbage is a cool weather crop, and, in consequence, we find such States as Georgia, Florida, Carolina, Tennessee, and Virginia growing cabbages which mature and are marketed in the north during late winter or early spring months, and the Northern States in turn supplying the Southern markets during the late summer and fall months. Owing to this arrangement of supplying markets, the growing of cabbage has very largely been taken out of the hands of the market grower and fallen into the hands of the farmer, and thus instead of being a garden or truck crop it becomes practically a farm crop, grown by a farmer who disposes of the crop to the shipper (usually a local man), and by him consigned or sold to a commission merchant or firm, and by them sold to the retailer. Owing to the high protective tariff on cabbage entering the United States, the Ontario growers are barred from shipping cabbage into those markets.

The cabbage growing sections in the States visited where a business is made of storing cabbage for winter markets is very largely confined to the States of Wisconsin and New York, and in the former State to the Racine and Appleton-Shiocton districts, and in the latter State to the Rochester and Syracuse districts.

Kraut factories were found in the five States visited, but predominate in the States of Ohio and New York. This applies more especially to the Clyde-San-

dusky district in Ohio, where there are eight factories, and the Geneva district in New York State, where in a radius of less than fifteen miles may be found five factories devoted to the business of making kraut.

All the sections visited do more or less of a shipping business direct from field to car. In speaking of varieties, they can be divided into two classes, Domestic and Danish. In the former the varieties will be largely All Seasons, All Head, Sure Head, Early Summer and some Flat Dutch. All are used in the manufacture of kraut and for shipping during the late summer and fall months. The Danish class will include Danish Bald Head, Hollander, and varieties of that type, and are stored for supplying the markets during the winter months.

Storage Rack, used in Wisconsin Cabbage Storage House.

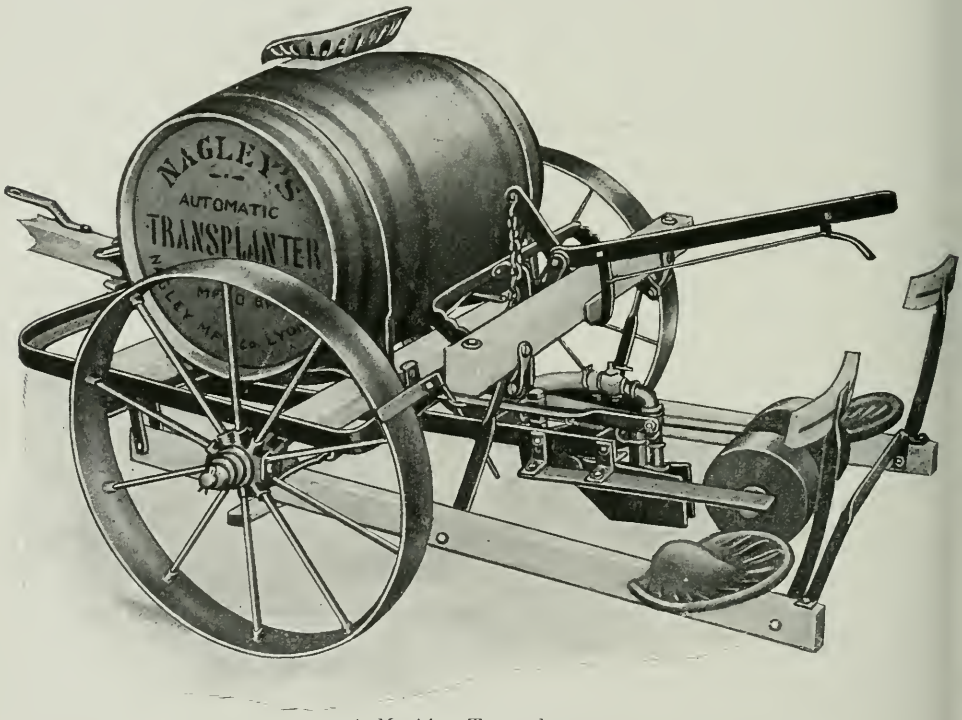
Saginaw District.

This district lies in the vicinity of the city of Saginaw and in latitude 43.20 to 43.30, and is perhaps the largest in the State of Michigan, having an acreage of approximately 1,200 acres, an average yield of 10 to 12 tons per acre, and price paid at cars or factory varies from $4 to $6 per ton. No winter storage is practised. Varieties grown are Domestic, and very little Danish. Soil varies from black sandy loam to clay.

Appleton-Shiocton District.

This district lies along the Chicago and Northwestern and Green Bay and Western Railways in the State of Wisconsin, and comprises a distance of about sixty miles, with storage houses at Appleton, Green Bay, Seymour and Shiocton. As the methods used vary in the different places mentioned in this district, a description of some of them may be of interest.

At Shiocton there are two storage houses. The stone building shown in the picture is 40 x 150 feet. The driveway through the centre is 11 feet wide, stalls 8 feet wide, and run from the driveway to within two feet of the wall. This two foot space between the end of the stalls and the sides of the building serves a double purpose. First, it allows a good circulation of air from small doors or

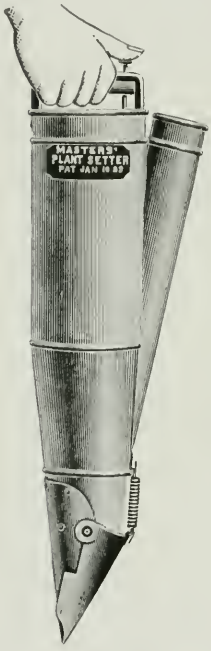


A Machine Transplanter.

vents along the side of the building and also the passage of a man to look after the opening and closing of the inside ventilators, according to weather conditions. Saplings four or five inches in diameter are placed across these eight foot stalls, allowing a space of two or three inches between each sapling, and about one foot above the floor. On these the cabbage are piled to a depth of four feet, stump down, then another row of saplings is placed across the stall, in a manner similar to the first lot, but about eight or ten inches above the heads of cabbage that have been placed in storage. Cabbage are placed on these to a depth of three feet, then racks are used. These are eight feet long and two feet wide. The long sides are two by two inches, sometimes two by three inches. Slats are 1 x 2½ inches, with the space of a slat between two. The rack in the picture is leaning against a storage house door and will serve as an illustration as to how they are made. The

method of placing the cabbage on them is as follows: A row of racks are placed one above the other, one foot space between them, beginning at the back end of the stall. The cabbage are placed on these racks, and when one is full another row of racks is placed in front of the filled ones, and this is continued until the front of the stall is reached.

After the stalls are filled, the driveway is used, the cabbage being piled on it to a depth of three feet and upwards. This district is the farthest north in which cabbage are stored, being in latitude 44.30. The soil varies from muck on lowland to clay on the upland. Seed in this district is usually sown April 20th to May 1st, and cabbage put in storage house from October 12th on. A preference seems to be given to Lond Island grown seed. Average date of killing frost about Sept. 12th. Acreage about 600. Transplanting machines used largely.



A Hand Transplanter.

Machine transplanters are a great aid to the grower, as with one, a team of horses, a driver and two boys to set the plants, four acres can be set in a day. Should the ground be dry the cask can be filled with water and by means of an automatic check valve each plant is watered at the roots before being covered with dry dirt. Some growers, with smaller acreage, use a hand plant-setter. These stand about 30 inches high, about 6½ inches in diameter and hold water enough to set 125 plants at one filling; an added advantage is that fertilized water can be used and an acre per day can be planted without stooping, thus doing away with the hardest feature of cabbage planting.

Green Bay.—The canning factory proprietor is the dealer and largest grower here. He has storage capacity for 2,000 tons—4 houses, 2 at farm and 2 in town, houses in town heated with steam pipes in cold weather; uses ventilators on sides and overhead, racks one foot apart and stores one layer deep. Has railroad tracks into the town houses and can load inside. Average yield for district, 8 tons per

acre. Does not approve of contracts, for the following reason: Should price of cabbage be high at delivery time the average grower feels as if the dealer was cheating him and if price of cabbage be low at delivery time, the grower sometimes buys cabbage from his neighbour cheaper than the dealer is paying under his contracts and unloads then on the dealer with a profit on the cabbage he did not grow.

Racine District.

This is probably the oldest large shipping and storage section for cabbage in the State, some large storage houses being located at Racine. At Berryville, a small shipping station between Racine and Kenosha, there is a house 40 x 200 feet, with a capacity of 1,000 tons cabbage. The owner places the shrinkage of cabbage at 10 per cent. to February 1st, after that date it gets heavier. His business is 20 years old and he is growing 125 acres at Somers this year. Owing to continuous cropping of cabbage, soil is infected with what is known locally as "Yellows," which attacks the cabbage very shortly after planting. There is also some trouble with black rot, but not serious. Land is very dear in vicinity of Racine and Berryville. There is none for sale, but $300 per acre is offered for it. Stable manure is used largely. This is usually supplemented with commercial fertilizer. Manure costs $1.40 and upwards per ton and is shipped in from Chicago. Date of setting cabbage plants in field varies from June 20th to July 10th. Soil varies from sandy loam to clay and clay loam. The last killing frost in spring varies from April 7th to May 31st, with April 27th as the average, and the first killing frost in the fall from September 30th to November 7th, with October 17th as the average. Average rainfall is 31.65 inches. The cabbage growing district lies in latitude 41.35 to 41.45. A large kraut factory in Racine takes the product from a number of acres. A description of a storage house in this district, which was built 4 years ago at a cost of $3,000, may be of service.

Size of house 40 x 80 feet, height to eaves 12 feet, 9-inch brick wall, 2-inch air space, 4½-inch brick wall—an air space of 1½ inches—matched sheeting, also heated on sides by means of a small hot water heater and 2-inch pipe; 4 ventilators on each side 1½ x 3 feet; 3 ventilators on the comb of the roof and one on each gable end. Roof sheeted and paper lined and runs right up to the comb; stalls 8 feet wide, 12 feet deep; passage way between stalls and walls 2½ feet wide and 6 feet high; racks over passage-way, also over driveway, right to roof; racks one foot apart and cabbage stored one deep. Capacity of storage house 400 tons. In conversation with the owner of the above house, the question was asked, "If you were building again, where would you improve upon the present house?" His answer was, "I would not put on the inside sheeting, and would burn more coal." That is to say, he would not build the house quite so warm, and in cold weather would use the hot water heater and pipes to keep out the cold and at the same time keep the house dry.

Riverdale District.

This district lies in the northeastern portion of the State of Illinois and runs east into the northwestern part of the State of Indiana—from Riverdale, Ill., to Highlands, Ind.,—and includes about 2,000 acres of cabbage, all domestic and used for kraut and shipping. Lake County Produce Company is a co-operative association of farmers, manufacturing kraut and shipping cabbage at Highlands, Ind., which has been very successful. The yield varies from 12 to 15 tons per

acre. Cabbage is shipped in refrigerator cars about August 27th, with an A shaped rack 3½ feet high and 2 feet wide at bottom, running lengthwise of the centre of the car. Cabbage are piled on both sides and over this rack, about 4½ or 5 feet deep in the car; twelve tons or more of cabbage in a car. Ice costs $4 to $4.50 per ton and the A shaped rack is used to carry the cold air from the ice bunkers and distribute it out through the cabbage. Average price paid for past five years, $5.50 per ton, all domestic grown, some Faultless, which seems to be a strain of All Head.

The dealer was loading 8 refrigerator cars with cabbage on August 28th. He used a rack 6 inches wide and 4 feet high, through centre of car lengthwise for ventilation. Average plot is 3 or 4 acres, none over 15 acres. All domestic, no storage, some imported. Holland seed of an Improved Brunswick variety used with success. Some black rot, but not serious. Some trouble with club root, (the pictures "Specimen of Club Root" and "Section of a Field Troubled with Club Root," on pages 99 and 101, were taken within one-quarter of a mile of Riverdale station). Land, nice loam, worth $1,500 to $2,000 per acre, held for investment. Rents for $9 to $10 per acre.

Storage House in the Racine District.

Clyde-Sandusky District.

It is estimated that there are 3,000 acres of cabbage grown in this district. Eight kraut factories. Average yield 12 to 14 tons. Average price, $5 to $6 per ton. "Yellows" very bad, so much so that older districts are quitting the growing of cabbage and kraut factories are seeking acreage further away from factory. All domestic. Some growers complain of time lost at factory, waiting to unload. The farmers in this district are of a fine class, manure heavily and supplement with commercial fertilizers. Planters used almost exclusively and clean cultivation practised. A rotation of potatoes, cabbage, corn and wheat is very largely used.

New York State is divided into two districts, known as Rochester and Syracuse Districts.

The Rochester District reaches from Albion on the west to Lyons on the east and from Webster on the north to Geneva on the south, and it embraces local dis-

tricts where both domestic and Danish stock is grown, also districts where cabbage is grown for kraut factories.

Acreage about 500, almost all fall shipped. No large storage houses. Using ordinary box and stock cars (Nov. 3rd). Average grower has 6 to 10 acres cabbage. Soil, loam approaching black, subsoil gravelly. Plow deep, 9 inches. Barnyard manure, ½ ton commercial fertilizer, used per acre—1-2 Ammonia, 10 Phosphoric, 8 Potash. Rotation used, potatoes, cabbage, wheat and hay. Plant in field June 1st to July 4th. Harvest from field as late as November 15th. Paul Martin, progressive grower, saves and selects his own seed of Surehead and Holland varieties, very upright, outside leaves very few; has small storage house, 3 air spaces, stone basement used for potatoes, cabbage on first floor and apples overhead. Uses A shaped racks 4 feet high and 1½ feet wide at bottom, placed 3 feet apart on the floor, and piles cabbage between racks four feet deep with good success, no trouble from freezing.

Loading Cabbage Direct from Field to Cars—Fall Shipment.

Henrietta.

Acreage 250. 15 per cent. Danish, balance domestic. Storage house cement blocks, air space and matched sheeting. Cabbage in bins 8 or 9 feet deep and bins 4½ feet wide and 1 foot air space between. Cabbage piled stump down. Average price past five years about $5 per ton. Prices in 1907 averaged $8 per ton, in 1908 ranged from $15 to $22, in 1909 started at $8, dropped to $5, now (Nov. 3rd) $6.

Hall's Corners.

One dealer here last year loaded over 500 straight cars of cabbage, also several part cars. This year will not load 200 cars. Cabbage a failure on account of dry weather and lice. 10 per cent. Danish, balance domestic. Small storage, average price paid past five years about $6 per ton. Trouble experienced in growing plants owing to root maggot. Screening and salt used, but not satisfactory. Plants shipped in by express from Pennsylvania and Maryland for $1.25 per 1000 laid down, and are getting very good results. Some black rot, but not considered serious. Soil, clay loam.

Seneca Castle.

Acreage very heavy. Crop almost a complete failure this year owing to dry weather and aphis. One grower on Otley road harvested 12 tons from 5 acres. Some growers turned sheep on their cabbage fields. Storage house 40 x 120 feet, frame, 2 air spaces, frost proof or nearly so; 6 ventilators on roof, 10 on each side, 6 inches square; bins 3½ feet wide, air space between, slat bottoms 1 foot above floor, driveway through the centre. 2 foot space all around house, bins filled 6 feet deep with cabbage, stump up, then slat floor, then cabbage 4 feet deep. The reason floor is used is so as not to tramp the cabbage when placing them in the bins. House holds 600 tons. Cabbage is brought in by cars from Skaneatles and is extra choice stock.

Syracuse District.

The older portion of this district lies along the Syracuse and Binghampton branch of the D.L. & W.R.R. and reaches from Onatavia to Cortland, with large

Storage Houses in Syracuse District.

storehouses at Apulia and Homer. All along this valley the farmers seem very prosperous dairymen, growing cabbage as a side line. Soil, clay loam. Stock very good, yields heavy. Variety Danish, some red. Seed beds screened on account of root maggot, but has not proved satisfactory, plants raised in New Jersey and shipped in by express for early crop. Apulia, four storage houses, total capacity, 2,200 tons.

The large building at the left is 40 x 150 feet, and has a capacity of 1,000 tons of root maggot, but has not proved satisfactory; plants raised in New Jersey and meter, and large galvanized pans are placed under each ventilator to catch the drip for, during cold weather, frost will accumulate on the inside of these ventilators, and, when the weather abates and becomes mild, this melts, and would cause the house to become very damp were it not for these large pans. These houses are built of 4 thicknesses of boards, 2 of paper and have 2 air spaces including the studding. They were the only storage houses I saw that used glass in the upper side ventilators. The sashes were double glazed and board shutters used on the inside, the reason for using glass being that by admitting light the cabbage would not bleach so quickly, but would keep green longer than where kept in darkness.

The storing here is in bins 3 feet wide, with space of eight inches between each bin and a two foot space left all around the inside of the building. The cabbage are piled in these bins six feet deep, then a floor is laid and cabbage piled 5 feet deep, then another floor and 4 feet of cabbage on this. The floors are laid for the protection of the cabbage, the men standing on the floors when placing the cabbage in storage or removing them. The above method is used for three of the houses. In the other small house, shelves are used. These shelves are about 7 feet in width and are spaced nearly two feet apart. The cabbage is stored on them as shown in the cut.

The small building at the front is an ice-house and is used for storing ice, to be used in cars when shipping early fall cabbage.

Cabbage Stored in Bins—Syracuse District.

This dealer uses a method of loading cars out of storage not practised elsewhere. The cabbages are loaded out of the storage bins direct on to the waggon; they are then taken to the weigh scales and weighed and then to the car, where two men stand at the door and take the cabbage, six men trim and as it is trimmed it is placed in the ends of car. The refuse is then put in the waggon and taken to the scales and weighed and thence to the dump, thus giving net weight of clean cabbage and keeping storage house very clean. This dealer started into business here fifteen years ago handling two cars of cabbage, and has built up a business handling 600 to 700 cars annually.

Homer.

This town has also two large cabbage storage houses, capacity 2,000 tons, and three or four small ones. The bin method is used. One of the dealers here who

has been in business twelve years said his shrinkage varies from 15 per cent. upwards, depending on how late the cabbage is held, and the average price ranged between $8 and $9 per ton. Mostly Danish stock grown, some Autumn King, and it seems to be giving satisfaction.

At Albion, N.Y., there is a modern cabbage storage equipment. The building is 200 feet long, 60 feet wide, and 20 feet to the eaves. This building is built out of brick, and the brick were laid so as to leave a four-inch air space between the walls, each wall being plastered with Portland cement, on the inside wall building paper and matched sheeting. The roof has an arched ceiling with doors that can be let down for the purpose of ventilation, and it also has ventilating towers running out through the roof.

Cabbage Stored on Shelves—Syracuse District.

A railroad track runs through the centre of this building so that cabbage can be loaded either in or out, without weighing on small scales. On each side of the track, there are bins 33 inches wide in the clear; 6-inch studding is used between these bins thus allowing a 6-inch air space for ventilation purposes. 3-inch slats are nailed on the studding 3 inches apart. Floors are put in dividing the bin into three sections, regarding height. The bins are about 20 feet deep, so that each bin is 33 inches wide, 20 feet deep and 20 feet high. All doors and windows are double. In addition to this, in the end of the building and above, there is installed a 60-inch fan run by a 5 h.p. electric motor, and from that fan a pipe 20 inches in diameter branches each way and runs over the centre of the top of the bins and is gradually reduced until it gets down to 6 inches at the far end of the building. This pipe has openings about every ten feet and is so graduated as to draw the air equally from all points of the building.

On the floor under the bins and running lengthwise of the building and in about the centre of the bins is an air duct about 16 inches wide, with openings where the 6-inch space is between the bins. Every 15 feet on the outside of the building are small doors and openings about a foot square, from which ducts lead to the large long ducts that run lengthwise under the bins. When they want to change the air in the building the fan is started and this draws the air in through the ducts and up through the cabbage and out of the building at the fan. The claim is made that the air in the house can be completely changed in about an hour's time.

This building has been run for a number of years and the owner claims that cabbage is taken out with less shrinkage than from any other building in the country.

Other Methods of Storage.

In the Syracuse district I saw a dealer who, when his storage house is full, piles cabbage on a clean piece of sod, three deep, and covers this with marsh hay. If snow comes before hard frost sets in, the snow helps to protect the cabbage and they will come out of those quarters with less loss and shrinkage than if placed in a storage house. If, however, cold weather sets in without any snow, the loss and shrinkage is very heavy.

Most growers of late cabbage either in the United States or Canada have some unmatured cabbage left in the fields unharvested. With some growers this is left to be turned under by the plow. With others the cabbage are taken and stored in pits, as recommended and described in "Storing cabbage for seed," or they are taken and planted closely in cold frames and the frames covered with coarse litter or manure and it is surprising how those soft heads will fill out or mature in the pit or cold frames. This method is well worthy of trial by most of our Ontario growers.

SAUER KRAUT INDUSTRY.

This industry, which is so closely related to that of cabbage production, is in its infancy in this Province. Some of the pickle manufacturers have started the making of kraut during the past two or three years. One manufacturer was visited who put up 1,000 barrels of kraut this year. Three years ago none was made. New Ontario is the heaviest consumer of it and the demand is increasing very fast.

As an evidence of the extent of this industry in the United States I quote the following from a letter received from the Secretary of the National Kraut Association: "It would be an impossibility to give you any accurate figures as to the number of kraut factories, the amount of kraut made, or cabbage used for making kraut, in the United States, the kraut business being most peculiar, in the fact that almost anyone can manufacture kraut in a limited way. There are probably several hundred concerns in our country which would consider themselves manufacturers of kraut. Many retail firms will cut sufficient cabbage to manufacture their own kraut, and call themselves factories. There are about twenty-five members in the Association who manufacture something over 3,000 carloads of kraut per year; this would probably figure in the neighbourhood of 100,000 tons of cabbage. The average price paid for cabbage would be between $5 and $6 per ton to the farmer. There has been a very large increase in the manu-

facture and consumption of kraut during the past five years, but I can give no accurate figures as to the percentage of increase. Nearly forty per cent. of the kraut manufactured was sold in cans."

One would naturally think that the best cabbage for boiling would be the best for kraut, but those who make it say not. The manufacturers prefer a solid head of good size and medium earliness. All Head, All Seasons and Surehead are the varieties chiefly used in the manufacture of kraut.

It is not necessary for me to go into details of manufacture and distribution. From the above it will be seen that much may be accomplished in developing this industry in this Province.

Delivering Cabbage at a Kraut Factory in Ohio.

How to Make Sauer Kraut.

Take good sized, firm cabbage of the drumhead type, remove the outer green leaves of the heads, then the core. The heads are then put into the Kraut Cutter, to be cut in the longest, finest strings possible. This should be put into the barrel as soon as possible; if left exposed to the air without being salted, it will hinder fermentation and is also apt to turn grey or black. Clean, tight barrels should be used, a layer of the cut cabbage about six inches deep is put in and this is strewn with salt. The amount of salt used should not exceed 3 per cent. of the amount of cabbage (in weight 3 lbs. salt to 100 lbs. cabbage). After the layer of cabbage is salted, it is pressed or stamped down firmly and evenly so as to expel the air. In this manner layer upon layer is packed in, until the barrel is filled. The cabbage is then covered with a clean cotton cloth and this is covered with a perforated hardwood cover, which is weighted down with stones or other weights, to prevent the air from coming in contact with the kraut. Always keep the kraut covered with brine.

By salting, the greater part of the water contained in the cells of the cabbage is extracted, and in combination with the salt forms the brine.

Kraut requires the most careful attention while it is in a state of fermentation. The best temperature will be found to be 59 to 64 degrees Fahrenheit. After fermentation it will keep best in a cool place.

CAULIFLOWER.

Ontario Methods.

The cauliflower industry of this Province is as yet confined to the market growers in the vicinity of large cities and towns. They supply the markets from the month of August, until heavy frost stops production in the fore part of November. The early markets are supplied from the States of Florida and California from February until May. They can be carried safely in refrigerator cars without heating or damage in transit.

Cauliflowers are also grown in quantity for the pickle factory. This is usually done under contract—that is, the grower signs an agreement or contract with the pickle manufacturer to grow a stated number of acres or tons, usually tons, of cauliflowers, for a stated price. The usual price paid in this Province varies from $25 to $30 per ton. Some cauliflower has been imported from Europe by pickle manufacturers, but when freight and duty were paid upon the same it was found to be more expensive than home grown stock at the above prices. It is impossible to give an accurate statement of the amount of cauliflower used annually by pickle manufacturers in this Province, but a conservative estimate would be about 550 tons.

Cauliflowers delight in a cool, moist atmosphere, and for that reason most growers do not have success in trying to produce early ones. For the general crop of cauliflower the culture does not differ essentially from that of late cabbage. The soil is prepared the same, the seed is sown and the plants are set in the same manner, but the culture given to the cabbage by the average grower will not suffice for the cauliflower, which insists on thorough tillage and liberal treatment.

Soil.

The soil for the production of cauliflower will depend partly on the climate. In a warmer climate a heavier soil is required than in a cool one. Generally speaking, a good rich loam, with a cool, retentive subsoil, will prove ideal for the growing of this crop. In the past, many growers have supposed the character of the soil to be of more importance than the condition of the same, but, in the light of recent developments, this seems to have been a mistake. Outweighing either character or condition of soil, stands climatic influence or conditions and this seems to have more to do with success or failure in growing this crop than any other one factor. There is no crop about which there is so much uncertainty as the cauliflower. No calculation can be made as to the exact time of sowing the seed or setting the plants that will insure success. The early, the intermediate, and the late plantings are in turn profitable and by early, intermediate, and late plantings, I mean plantings that are made a week or so apart. So it will be seen that it is

almost a necessity to make a series of plantings, one or more of which will invariably succeed. Cauliflower is more sensitive to checks in its various stages of growth than cabbage.

Seed.

In the seed bed, a strong, sturdy growth should be encouraged rather than a rapid one. Seed should be sown during the month of May, the exact date depending on the soil and climatic conditions governing the different portions of the Province. At Guelph, on a rather strong clay loam, we prefer to sow seed the first week in May.

Planting.

The best time to set plants is just before or after a rain, but they can be put out at any time, providing the soil has been kept moist by previous frequent cultivation. In dry, clear weather the planting should be done towards the close of the day. The plants to be set out should not be too large or they will be liable to button, especially is this liable to happen should the conditions be in any way unfavourable to growth. If large plants must be used, extra pains should be taken in setting in order that there may be as little check in their growth as possible. With cauliflower, as with cabbage, large plants are easiest to grow, but for the reason stated it is less desirable to use them. The plants are usually set in rows three feet apart and are spaced two feet apart in the row. They should be ready for planting in the field in five or six weeks' time after sowing the seed.

Cultivation.

This should start almost immediately after planting so as to keep up a steady, vigorous growth, for if the plants are checked they are liable to either button, that is, to form a small, miniature head, prematurely, or to continue their growth so late as to fail to produce heads at all. Level cultivation is usually practised as for ordinary field crops. This should be fairly deep at first, working shallower and narrower as the plant makes growth and should be kept up until the leaves are so large as to be liable to be broken off either by the horse or cultivator, in their passage between the rows, or until the plant shows signs of heading. The crop may be seriously injured or delayed by cultivation after the plants begin to head. At this time the soil should be undisturbed, so that the roots may occupy the entire space. Dry weather and the compact nature of the soil after cultivation ceases check the growth of the plants and promote the formation of heads, provided the plants have attained a proper age and size.

Blanching the Heads.

The value of cauliflowers for use or market depends almost entirely on their being white and tender. To have them so, they must be protected from the sun. Heads which are left exposed to the sun become yellow in color, or even brownish purple, if the sun's rays are very hot. Such heads acquire a strong, disagreeable flavour and are unsaleable. There are various ways of covering the heads, but it is nearly always done with the leaves of the plant. The practices in use in this Province are as follows: When the heads are about the size of a coffee cup, they are tied with twine or wire, bent so as to form a loop on one end and a hook on the other end, the leaves are all gathered up and the wire placed around them, hooking the

one end into the loop, thus holding the leaves in an upright position and covering the head proper from the rays of the sun. The tying should be done when the plants are dry and during the warm part of the day when the leaves are supple. Some growers prefer to tie their plants up tight, while others like to leave the top of the plant as open as possible so long as the sun does not spot them. By leaving the top slightly open the pressure of the leaf on the head is decreased, thus allowing it to broaden out more than where the plant is tied up tight. This artificial blanching of the head is most important early in the season while the sun is hot. The field should then be gone over every other day. Another object gained by tying late in the season is to protect the heads from frost. A frosted cauliflower is practically worthless for market, as it is nearly certain to turn black after one or two days' exposure. Heads which are well covered will usually stand ten or twelve degrees of frost without injury, depending on the amount of cloudiness or moisture present.

Cutting and Marketing.

The frequency of cutting will depend on the season and climatic conditions. In summer the heads will remain at the proper stage for cutting no more than a day or two, while late in the season they may be left a week without becoming overgrown. Frequent cutting is desirable as it is best to let the heads get as large as possible, but not allowing them to become loose and warty. The gain in size increases the selling price, and the flavour also appears to improve as the heads approach maturity. It is better, however, to cut a head too soon than to leave it too long, for a small, solid head will sell for more than a larger, loose one. To judge when a head has reached full size requires some skill and experience. Usually this can be told by the way it forces the leaves outward. Upon examination it will be seen that the surface of the head becomes more distinctly grained as it approaches maturity. To examine a head do not untie the twine, but part the leaves at the side and the condition of the head can be easily seen. There are two methods used in cutting. Some growers prefer to cut and trim in the field. For this purpose a long, thin-bladed knife is used. The head is cut with enough of the stalk to leave two or three full circles of leaves to protect the head. The leaf is trimmed off by some growers even with the top of the head, or "flower"; others prefer to trim the leaf as low as possible without showing the bottom of the head, "curd" or "flower.". A good many growers prefer to cut the stalk or stem of the plant below the bottom leaf and draw the heads to the packing shed, there to be trimmed and packed. The reason for cutting below the bottom leaf is to check growth in the remaining part of the stump or stalk; when it has no leaf, growth ceases. The heads must be handled with care to prevent the "flower" from becoming bruised or soiled. A bruise will turn black in a short time and thus injure the sale of the head. Slatted bushel boxes and berry crates are favourite packages used for the marketing of cauliflower. These should be lined with clean paper and the heads packed carefully therein, so as to carry without bruising. Cull carefully, discarding all flowers that will not grade as first class. Dispose of these to the pickling factory.

Keeping.

At the end of nearly every season most growers will have more or less small unmarketable heads in their fields. These can be used for the purpose of keeping or prolonging the season. When the weather gets cold so as to check plant growth,

in the fore part of November, the plants that show signs of heading are stripped of their larger outer leaves, are taken up and carted from the field to be set close together either in a cellar, under a greenhouse bench, or in beds covered with hot bed sash. When set in beds care must be taken to protect them from freezing. This is done by using straw or coarse litter, covering the sash with it. When planting the heads, just enough moisture should be given to keep the plants from wilting; if too much water is given they are liable to develop rot. A method used in Denmark is to make a bed of moist sand about four inches deep in a cool room protected from frost. Towards the end of the season, the heads are cut with a piece of the stem three or four inches in length which is stuck into the sand. All the outer leaves

Cauliflower Plant Tied with Straw Band.

are removed except the inner course, which are trimmed down fairly close, the heads are then covered with flower pots. Sometimes early in the season the market price may be low and retarded development of the head may be desired. For this purpose the plants may be cut below the bottom leaf when the plants are nearly mature. They are then carted to a shed or some shady place and set up on the stump end, where they can be kept in this condition for a week or so, depending on where they are kept and weather conditions.

Varieties.

The varieties of cauliflower differ among themselves less than those of most cultivated vegetables. Their tendency to degenerate, especially under unfavourable conditions, and the readiness with which they may be improved by selection, has

given rise to many so-called varieties. The growers in this Province may be said to use one strain or another of Dwarf Erfurt.

The Ohio Experimental Station, in 1889, in a variety test of cauliflower, reported twenty varieties under test as being so nearly identical with Early (Extra Early) Erfurt, as to be considered strains of that variety. Cauliflower seed is grown in France, Germany, Italy and Denmark. Puget Sound in the State of Washington is the only place in America where cauliflower seed can be grown successfully. Danish seed seems to be given the preference by discriminating growers and commands a somewhat higher price.

Composition of the Cauliflower Plant.

To show the relation of the cauliflower crop to soil exhaustion and the value of the refuse portion for fertilizing purposes, the following analyses are included. They were made by Mr. J. F. Harries, and are embraced in a study he is making of the chemical composition of the cauliflower. The plants were furnished him by the garden department of the College, during the season of 1909, and represented a good average crop. They were grown on a fairly rich clay loam. The samples were taken when the heads were in the best condition for market, and at different times covering a period of about a month. To make the terms Head, Leaves, and Root, clear, the following definition will apply. Head—represents that portion of the plant known as "curd" or "flower," and is the part partaken of as food. Leaf—is all leaf growth. Root—embraces not only root, but that portion of the stalk between the head and root.

The following represents an average of the different samples:

Dry Matter and Principal Constituents of Different Parts of the Mature Cauliflower Plant.

Components.	Heads per Cent	Leaves per Cent.	Root per Cent.
Water	93.16	91.09	85.07
Dry Matter	6.84	8.91	14.93
Total	100.00	100.00	100.00
Organic Matter	6.12	7.28	13.20
Mineral Matter	0.72	1.63	1.73
Dry Matter	6.84	8.91	14.93
Pure Ash	0 712	1.571	1.589
Sand and Silica	0.008	0.059	0.141
Crude Ash	0.72	1.63	1.73
Lime (CaO)	0.067	0.402	0 281
Magnesia (MgO)	0.021	0.058	0.076
Phosphoric Acid (P_2O_5)	0.102	0 105	0.151
Potash (K_2O)	0 245	0.225	0.464
Soda (N_2O)	0.084	0.216	0.328
Sulphate (SO_3)	0.064	0.218	0.138
Nitrogen	0.34	0.365	0.359

An acre of ground planted with cauliflower in rows three feet apart and plants two feet apart in the rows will allow for 7,260 plants, allowing for misses and ground used for headland or turning at the ends of the rows, say, 7,000 plants to the acre. Allowing that 6,000 plants head up and are harvested, yielding, say, five tons of heads per acre, the refuse matter, consisting of leaves from the 6,000 mature and 1,000 immature plants, will average 2 1-2 lbs. each, a yield of 17,500 pounds per acre and 7,000 stalks and roots averaging 3-4 pound each will make 5,250 pounds.

Combining the above figures it will be found that an average crop of cauliflower will require during its growth the following amounts of plant food per acre:

Pounds of Fertilizer Found in Cauliflower from One Acre.

	Heads. Pounds.	Leaves. Pounds.	Roots. Pounds.	Total Pounds.
Phosphoric acid	10.2	18.4	7.9	36.5
Potash	24.5	39.4	24.4	88 3
Nitrogen	33.9	63.8	18.8	116.5
Lime	6.7	70 4	17.2	94.3

Cauliflower Growing Under Glass.

Cauliflower is also grown under glass by a few growers, who have found it to be a profitable crop. Although Florida and California ship cauliflower which are strong competitors against the greenhouse grown, as they are on the markets at the same time, yet greenhouse grown cauliflower will usually command a price fifty per cent., or upwards, higher than stock shipped in from these States. This is owing to the acknowledged superiority of the greenhouse grown product, such as less acidity, more delicate flavor, whiteness and finer texture, in comparison with outdoor grown stock.

Although the forcing of plant life is an expensive enterprise, and one not to be entered into lightly, or unadvisedly, yet I can see no reason why a demand for greenhouse grown cauliflower cannot be built up in this Province, providing some good grower would undertake to supply the goods and, by doing some advertising and building up a reputation for quality and reliability, make a success not only of the growing of cauliflower under glass, but the building up of a profitable business as well.

Seed of the Snowball or Dwarf Erfurt type, is sown in flats or beds, about November 1st, if the crop is to be marketed in April or May. When the plants are in their second leaf they are given their first transplanting, about two inches apart. This is followed by a second transplanting, this time into pots of the 3 or 3 1-2 inch size. When they have made good, strong, stocky plants, they are planted into the permanent bed. By the second transplanting, root development is encouraged, and by the use of pots the change can be made into the permanent bed with the slightest possible check to the plant. It is a well known fact to the

cauliflower grower that this crop cannot be stunted without serious loss; from the start to the finish the one main object is to keep up a steady growth.

Ground beds are always used for this crop. The soil should be a rich loam, into which should be thoroughly incorporated plenty of well rotted manure; a liberal dressing of fine bone meal should be worked into the surface—say one pound for every 20 square feet of bed.

Some growers use a dressing of air-slacked lime before planting; others prefer to use a small handful of shell lime sprinkled around the plant. The distance apart of setting plants varies with the different growers from 18 to 22 inches each way. The intervening space between the plants is usually utilized by some quick-growing crop, generally radishes.

A day temperature of 65 to 70 degrees F. with a drop of 10 to 15 degrees at night seems to be the best for this crop.

Care should be exercised in watering, and although cauliflower like moisture, care must be used not to get the soil too wet.

When the plants commence to develop, a little nitrate of soda worked into the soil will be found helpful. The methods of bleaching the heads differs from the outdoor crop Breaking the leaves down over the head, even tying the leaves, is not as satisfactory as the placing of several thicknesses of paper directly over the head. Folded newspapers answer this purpose.

Green aphis can be kept in check by ordinary fumigation with either tobacco stems or any of the prepared forms of nicotine. Cabbage worms will generally put in an appearance and will need to be picked off.

The prices received for this crop vary from as low as $1.50 to as high as $5 per dozen, with perhaps an average of $3.50. This would give a return of about 13 cents per square foot of bed, for plants set 18 inches apart. The above returns do not take into account the radish crop, which occupied the ground when the plants were first set and which should give a return of 10 to 15 cents per square foot of bench, allowing for the space occupied by the cauliflower plants. Some large greenhouses were seen at Mattituck, N.Y., where the grower harvested two crops of radish and one crop of cauliflower. This was done by growing the plants in a separate plant house, and if enlargement of plant, neatness and thrift are evidence, he is well on the way towards the goal they call success.

Cauliflower in the United States.

It is almost an impossibility to secure any figures as to the extent of the cauliflower industry in the United States in latitudes or districts similar or applicable to districts in Ontaro. The conditions in the Buffalo district in New York State would, probably, be the nearest approach to those in this Province. The growing of this delicious vegetable is as yet largely in the hands of the market grower and the grower who grows under contract for the pickle factory. The two districts to which exception is taken are both in New York State, viz., the Buffalo and Long Island districts.

Long Island Cauliflower District.

This lies in the Eastern portion of Long Island, and from figures furnished by the Long Island R. R. Industrial Department the following is noted: In 1905 the freight shipments of cauliflower by rail amounted to 10,075 tons, and the express service handled 3,500 tons of cauliflower, a total of 13,575 tons of cauliflower for that year. In 1909, the cauliflower special train ran from Sept. 10th

to Dec. 20th inclusive. This train carries nothing but cauliflower and has been known repeatedly to carry over five thousand barrels, or thirty carloads, of cauliflower at a time. The shipments by freight for 1909 were 17,969 tons. This will give a better insight into the size of the industry as conducted on the Eastern end of Long Island than any other example that may be cited. The truckers at the Western end of the Island, lying close to and adjacent to the City of Brooklyn, also grow many tons of cauliflower. These are sent into the New York markets in large truck waggons and are not included in the above figures.

The methods used by the growers at the Eastern end of Long Islang from Calverton to the extreme east end of the Island vary very little, except in what appear to be minor details. A large number use the horse transplanting machine for setting the plants, others still cling to the old-fashioned method of planting by hand. Stable manure varies in price, depending on the season of the year, from

Cauliflower Plant "Tucked."

$1.40 to $1.90 per ton on the cars. Commercial fertilizers are used freely by most growers. Methods of production of plants, planting and cultivation, differ very little from those practised by the growers of this Province. It is in their methods of tying up, preparation and packing for market, where they differ, not only from growers elsewhere, but among themselves. The Long Island cauliflower grower practises three different methods of tying his plants for bleaching purposes; this is for the purpose of saving time when cutting. When the plants get to the tying stage a man carrying a small bundle or sheaf of long rye-straw in a sack (made for the purpose and tied around his waist) passes down between two rows of plants. When he sees a plant which needs tying he draws a few straws out of the bundle, making a short band of them. Then he passes both arms around the outer leaves of the plant, drawing them together and tying them with the straw band, so as to exclude the rays of the sun.

Another method is to select two nice long leaves, one on each side of the plant, say lengthwise, of the row. Then all the other leaves on that quarter of the plant on the side where you selected your first leaf are folded over the flower or curd, then the quarter of the leaves directly opposite are treated in the same way, then either one of the remaining quarters is treated likewise, and then the last and remaining quarter is folded over the others. The operator now takes the leaves he first selected and tucks or draws the end of the upper one through or under the one below it, forming half a knot. This is called tucking, and while it seems difficult very little practice makes it so simple that it is surprising how fast you can tie cauliflower in this way. The plant, when tied, is inclined to be balloon-shaped and by folding (not breaking) the leaves over each other, the bottom portion of the leaf bows out and away from the "flower" or curd, thus allowing it a better chance for development.

Waggon Rack used on Long Island for Carrying Cauliflower. (This also shows the type of barrels in general use for packing cauliflower).

Some growers vary this tie by having the "tuck" crossways of the row at the point of tying, and lengthwise of the row the next time, while other growers will carry a bunch of toothpicks or some short pieces of rye straw in the pocket and stick one into the tuck to distinguish one day's tying from another.

The main object of having the three distinguishing ties is that when the time for cutting comes all those tied on a certain day are cut at the same time. The assumption is that, if all the plants are not ready for cutting, they should be, and, if the grower had not used the three different marks for tying, he would be compelled to look at every head before cutting.

There are two methods of packing, known as short cut and long cut. Long cut is almost always put up in the field. Barrels are taken to the field and placed at convenient distances apart along the row or driveway. With a good, strong, sharp knife the plant is cut a short distance above the bottom leaf. Another cut three or four inches above the top of the head or flower removes the surplus leaf

Packing Cauliflower in the Field.

growth; the balance of the leaf is folded over the head as a protection when packing it in the barrel. Usually second-hand ventilated barrels are used and the cauliflower should be well and tightly packed with the top of the barrel nicely rounded. The top hoop of the barrel is removed, a piece of burlap or bagging is placed over the cauliflower for a cover, the hoop is replaced and fastened on one side; the operator leans over the barrel, pressing the heads of the cauliflower and drawing the cover as tightly as possible, drives the hoop down and nails it in place, thus holding the cauliflower securely.

Short cut are put up both in the field and packing house. When put up in the field the barrels are distributed in the same way as for long cut. The head is cut in much the same manner, with perhaps not quite so many leaves attached and is trimmed much the same as in Ontario. It is then placed in a basket which, when full, is taken to a barrel, and a layer placed in the barrel with the head of the flower facing in, a good strong sheet of paper is placed over each layer and an inch or so of excelsior or marsh hay is added and then another layer of cauliflower. This is continued until the barrel is well filled, when the cover is put on in the same manner as described for long cut. Field packing can only be carried on when the weather is fine and dry. Some growers prefer to use the packing house altogether and, when this is done, it necessitates the removal of all trimmings, and a little more labour, but it permits of better grading being done and barrels are labelled No. 1 or No. 2. A considerable amount of cauliflower is grown for pickle manufacturers and when delivered to salting stations the head or "flower" is cut out entirely from the plant with no leaves attached. In 1908, a Mr. Young had 15 acres and delivered to the salting station 90 tons 300 lbs., at $40 per ton. The average price paid at salting station the past five years has been $35 per ton, and the average yield per acre for the same period has been slightly over four tons per acre.

There is a marketing association in this section known as the Long Island Cauliflower Association. By loading solid or full cars the railroad gives a reduction of four cents per barrel delivery at New York market. The Association charges the grower the four cents, but in return the Association looks after the supply of empty barrels and seed, keeps a man at the New York end to look after markets, and pays a dividend to the holders of stock. It also diverts shipments to other markets as well as acting as agent in accepting orders from commission merchants in other cities.

Buffalo District.

In the vicinity of Buffalo, N.Y., cauliflowers are grown and shipped in quite large numbers. The varieties grown are Snowball and Early Dwarf Erfurt. The usual date of sowing seed is about May 20th, so as to produce the flower the latter part of September and during October.

They are grown on soils of varied nature, clay, sandy loam, clay loam, gravelly loam, and black muck, and on all of these with success, depending on the season. Barnyard manure is used largely, also a commercial fertilizer analyzing 4-8-7. The Erie County Growers' and Shippers' Association use a crate for the shipment of cauliflower which holds 12 heads and these are trimmed with the outside circle of leaves about an inch longer than the head is high. By trimming the heads in this manner the heads can be packed in the crates alternately on their face and on their stump, and so far this method has proved satisfactory. All goods are graded and sales pooled. Crates cost 13 cents each. During the season of 1908, 33,816 crates were handled at an average return of 55.22 cents per crate to the grower. In 1909,

34,926 crates were handled at an average net price of 62.7 cents each. The cauliflower shipping season opens with the Association about Aug. 20th and ended in the season of 1908 on Nov. 5th, and in 1909 on November 26th.

Brussels Sprouts.

The cultivation of this, one of the most delicious of the cabbage family, does not differ materially from that of cabbage and cauliflower.

Most of the information contained herein was secured from Mr. Frank H. Case, a grower on the eastern end of Long Island, who for the past fifteen years

A Good Specimen of Brussels Sprouts.

has been growing and selecting this vegetable with a view of having the sprouts more firm and smooth and at the same time keeping a watchful eye on quality.

A variety or strain of the half dwarf is usually grown. Seed is sown on Long Island from June 1st to 10th and transplanting to the field takes place when the plants are five or six weeks old.

A sandy soil in good tilth with plenty of available plant food in it, seems best suited for this crop. About four months from the sowing of the seed they will be ready for picking.

Harvest and Marketing.

The harvest lasts in the field until the ground freezes up for the winter. An extra good yield would be a quart per plant. The Sprouts grown on Long Island are all marketed in quart berry boxes. The little heads are broken off the stems, taken to the packing shed and washed or well rinsed in clean water. They are then trimmed (that is the loose outside leaves are removed and the small stem trimmed), and are carefully packed in the berry boxes, special care being taken to put the little heads in firmly so that they will not shake or damage in transit. Care is also used in having the sprouts in the top layer top or headside up and many growers have their sprouts in regular rows.

Brussels Sprouts are sent by express from this section to supply markets as far west as St. Louis and Denver. As an evidence of the extent of this industry in this section, during the year 1905, there were shipped by express 160 tons of Brussels sprouts. The average price received this season has been low on account of the acreage being large and the crop heavy. They are worth in New York City at the present writing (Jan. 6th) from 6 cents to 12 cents per quart, strictly fancy bringing a little more. A crop grown by Mr. Case in 1904 netted over $400 per acre. Last year the crop was nearly a failure and netted him a trifle under $100.

The market has doubled in the consumption of this vegetable during the past five years, and most growers think it will double again during the next five years.

To Ontario growers contemplating the growing of Brussels sprouts, Mr. Case offers the following advice: Sow seed for this latitude from May 1st to 8th and plant out in the field in rows 36 inches apart and 30 inches in the row, working both ways with the horse cultivator, hand hoeing frequently, while the plants are small, and store in a locality where there is plenty of snow, in the following manner: Cut the plant even with the top of the soil. Put into a windrow about three feet high, A-shaped, being careful to have the tops up and on the outside. Cover with straw to the depth of a foot or so. After the sprouts have settled, the row proper will be not over two feet high. It is preferable to have this row run north and south for the same reason as given in pitting cabbage. Be sure and keep the snow off the apex, even in zero weather, if there be so much that the plants cannot get ventilation.

Cabbage Seed Production.

It is estimated that the American seed trade handles annually about 600,000 pounds of cabbage seed; less than half of this is imported from Europe, consisting mostly of early varieties. The remainder is produced chiefly on Long Island, and Puget Sound, on the Pacific coast. Some seed is also grown in New York, Rhode Island, Connecticut, Eastern Virginia, and some few of the Middle Western States. The source of supply of the cabbage seed used in America, as given me by a reliable authority, is as follows:

Long Island	20 per cent.
Washington State	30 per cent.
Elsewhere in the United States	10 per cent.
Imported	40 per cent.

Cabbage seed may be produced by three methods from solid or perfectly developed heads, from partially or half formed heads and from stumps from which solid heads have been removed.

Crate of Brussels Sprouts packed for Shipment.

From Solid Heads. This is practised for obtaining extra selected stock seed, or seed to be used for growing a commercial or field crop. It enables fraud to be critically performed as only extra choice heads must be selected for good stock.

From Partially or Half Formed Heads. With stock seed produced as above for starting the crop. A crop of commercial seed may be raised from partly developed heads. This is the method pursued by leading commercial seed growers. The advantages claimed for it are later sowing and such plants winter better than do solid heads, also heavier seed production and the promotion of earliness in the crop grown from such seed. The growing of seed for this crop is so timed that the plants will be just coming to a partial heading stage when it will be necessary to take them up for winter storage.

On Long Island the sowing of the seed for Early Jersey Wakefield is done from the 1st to the middle of July, for medium early varieties such as All Head,

Field of Early Jersey Wakefield Cabbage, for Seed.

about June 20th, for late varieties about June 10th, transplanting the plants to the field about five or six weeks after sowing the seed. Cultivation is carried on the same as for a crop of cabbage. About the middle of November the plants are taken up for storage.

Storing the Plants.

The general practice in storing is to run a cabbage plow close to the edge of a row of plants, loosening and lifting them. Every eighth or tenth row is then made into a trench to receive the plants which are taken out of the rows. This is made wide and deep enough for plants to be packed closely therein, three or four plants in width, roots down, slightly slanting, the roots being covered slightly with soil, and the tops but a trifle above the ground. The trench is then covered with earth by means of a large plow throwing up big furrows on and over the plants on each side. An asparagus ridger is then used to move the dirt over

on to the middle of the trench, and it is dressed up with the centre slightly higher, to keep water off and prevent hard freezing.

The trenches are uncovered in spring by running a plow as closely as possible to the buried plants, throwing the furrow away from the plants. The remaining dirt is then removed with a large wide hoe, leaving the plants ready to be taken out.

Planting.

In the spring as soon as the soil can be worked, the plants are set out in rows or furrows, which may be made in the same field in which the plants are stored. These furrows are made with a medium sized plow, going and returning in the same furrow, and they are four feet apart for early and five feet for later varieties. The plants are laid about two feet apart in the row or furrow, the stem of the plant parallel with the row, the head of the plant raising the stem, so that it will be on an angle of 30 or 40 degrees. The root is covered by the use

Field of All Head Cabbage set out in the Spring for Seed.

of large hoes drawing the soil from the side of the furrow on and over the root of the plant. Cultivation is kept up the same as for an ordinary crop. After the seed stalk grows up, the cultivator is used to throw earth up to the seed stalk to support it, so that when the plants begin to bloom they are growing on a ridge.

In planting out solid heads it is necessary to use a knife to cut the head so as to allow the seed bud to make its appearance. This is usually done by cutting the head across the top, making two cuts in the shape of a cross, cutting the head in quarters. Care must be taken not to cut so deeply as to injure the tender bud.

Seed from Stumps.

Stumps from which extra choice heads have been removed are wintered over in much the same manner as partially formed heads. This method is not to be recommended for the production of good seed.

Harvesting.

When the seed pods have passed what seedsmen call their "red" stage, they begin to harden, and as soon as a third of them turn brown, the entire stock may be cut. The cutting should be done on a clear, dry day, early in the forenoon, when the dew is on. For this purpose a long, heavy-bladed knife is used. The seed stalks are gathered in small heaps five or six stalks to a heap, the heads all one way, lying across the ridge on which they have been growing, the butt of the stalk in the hollow between two of the ridges. They are allowed to remain there for from three or four days to upwards of a week, to become dry.

Threshing.

This is generally done by laying a large cloth on the ground, one man bringing the small heaps of seed stalks and laying them on the cloth, while the other man beats the seed out with a flail. Some of the growers beat the seed out over the side of a barrel, holding the butts of the seed stalks in their hands; others use a threshing machine for the purpose.

Cleaning.

The seed is cleaned by running it through a fanning mill, after which it is spread on a cloth in the drying room and left for several weeks to become thoroughly dry. It is then run through the seed cleaner and stored in sacks ready for shipment.

On Long Island an average yield of seed is from 300 to 500 pounds per acre, and the price paid the grower ranges from 35 to 50 cents per pound.

INSECT ENEMIES AND FUNGOUS DISEASES OF THE CABBAGE AND CAULIFLOWER.

Flea Beetle.

This insect, also known as the ground flea, is very troublesome in some parts. The general remedies used are tobacco dust sprinkled over the beds, just as the plants make their appearance above the ground, also land plaster and Paris green mixed in the proportion of one pound of Paris green to twenty-five or thirty pounds of plaster dusted very lightly on the plants, early in the morning, when the dew is on and the plants a few days old.

Cabbage Root Maggot.

This is one of the most serious pests that trouble the grower of early cabbage. As yet no sure remedy has been devised, and the best thing to do, is to use preventative measures such as planting cabbage in a new place each year, as far removed as possible from the ground on which cabbage or any of the allied crops were raised the preceding year. Cook's carbolic wash is also used successfully; this is made as follows: One pound of hard soap, one pint of crude carbolic acid; 1 gallon boiling water. Dissolve the soap in boiling water and while still hot add the carbolic acid and emulsify thoroughly. For use dilute the above with 30

to 50 times its bulk of water; apply a cupful to the root of the plant. Tarred paper disks about three inches in diameter, with a slit from one side to the middle and placed around the stem of the plant, are also used with success.

Where it is found that the root maggot troubles the young plants in the seed bed, the use of cheese cloth screens for covering the bed is fairly satisfactory. Boards ten or twelve inches in width are laid on edge so as to form a frame, this is then covered with cheese cloth, thus preventing the fly from laying eggs on the young plants. The objection to this plan is that it tends to make the young plants of a spindly growth. Mosquito bar-netting is also used and seems to be an improvement over cheese cloth on account of allowing more light to the young plants.

A Club-Rooted Cabbage.

Cutworms.

The most successful remedy for this pest is the poisoned bran mash made as follows: Mix half a pound of Paris green in fifty pounds of bran, adding the poison to the bran a little at a time, stirring continually until the whole is tinged with a green color, then add water sweetened with sugar or molasses until the mixture is sufficiently moistened to crumble through the fingers. The mash should be scattered about the plants that are liable to attack, in the evening. The worms will feed on this mixture in preference to the plants.

Cabbage Butterfly.

The most effective remedy for this troublesome insect is pyrethrum insect powder—one pound thoroughly mixed with four pounds of flour and placed in an air-tight jar or can for twenty-four hours, so that the poison may become thoroughly incorporated with the flour. The mixture can be applied with a powder gun or a cheese cloth bag, dusting the plants lightly. This powder will kill the insects, but is perfectly harmless to human beings. Pyrethrum can also be applied in a liquid form as follows: Dissolve two ounces of the powder in three gallons of luke-warm water, and spray at once. Hot water applied at a temperature of 130 degrees F. will kill the worms and not injure the plant.

Aphis or Plant Lice.

These are very troublesome, some seasons, to the growers of cabbage and cauliflower, prolonged dry hot weather being favourable to their increase. Kerosene emulsion, and strong soap suds are the usual remedies applied, but are not satisfactory, especially where the acreage is large.

Fungous Diseases.

For most of these diseases there is no remedy and it is advisable for the grower to keep a close look out for the advent of these diseases in his soil, and to use preventative measures at all times, clean culture and crop rotation being the principal means.

Club Root.

Preventative measures are: Practise crop rotation and do not grow cabbage or any allied crop such as cauliflower, kale, Brussels sprouts, kohl-rabi, turnips or radish, on any soil oftener than once in three years. Do not use manure from stock fed with infested roots. Burn all refuse from infested crops. The application of lime, two or three tons per acre, has a beneficial result. Winter ridging of the infested land curtails the disease to a limited extent on the following crop. It can be carried from one piece of soil to another by the roots of plants; if the seed bed is infected, the plants from that seed bed will infect that part of the field to which the plants are transplanted.

Black Rot.

The first symptoms are darkening of the leaf veins. Avoid low damp soils. Practice rotation of crops as recommended for club root. Some varieties of cabbage are much more resistent to this disease than others. Houser, St. Louis, Drumhead and Savoys may be especially mentioned as being strongly resistent to this disease.

Wilt.

Wilt, in some parts known locally as "yellows," is caused by a fungus which attacks the roots, causing the leaves to wilt and die. No good remedy is known. Avoid infested land and use preventative measures as outlined above.

Stem Rot.

This disease affects the cauliflower much more than it does the cabbage crop. It is a bacterial disease and its development is favoured by moist, close, weather. There is no satisfactory remedy known for it. The avoidance of damp soils and locations might be of some benefit, but it is not practicable with the cauliflower.

Damping Off.

Damping off is usually associated with too moist a condition of the soil or atmosphere. When the plants are in the bed avoid overcrowding and give plenty of air.

Section of a Field Affected with Club Root.

Blackleg or Mildew.

This is a disease which attacks the stems of young plants either when wintered over, or in the hotbed. It is prevented and kept in check by keeping the seed bed dry. A dressing of sand or air slacked lime is also beneficial.

For further and more complete directions regarding Fungous or Insect Pests, not only affecting cabbage and cauliflower crops, but other vegetables, write to the Ontario Department of Agriculture for a copy of Bulletin 171.

VOTE OF THANKS.

F. F. Reeves.—I have great pleasure in moving a vote of thanks to the City of Toronto for the use of the rooms we have had to-day. Carried.

A substantial collection was then taken up for the Sick Children's Hospital.

The most successful meeting of the Ontario Vegetable Growers' Association was brought to a close by all joining in singing our National Anthem.

DELEGATES TO CONVENTION.

Delegate.	Address.
Adams, E. E.	Leamington.
Bailie, R.	Billings Bridge.
Baker, C. W.	Byron.
Bartlett, W.	Tambling's Corners.
Bell, J. S.	Peterboro.
Brotherton, F. R.	Todmorden.
Bryans, Jno.	Summerville.
Bushell, R. J.	Kingston.
Butchart, Robt. A.	Jordan Harbour.
Clark, G. H.	Ottawa.
Dandridge, Jas.	Mimico.
Davis, J. J.	Byron.
Dawson, S. D.	Tambling's Corners.
Delworth, J.	Toronto.
Delworth, Thos.	Weston.
Everingham, J.	Toronto.
Fuller, F. G.	London.
Green, G. de W.	Toronto.
Hare, J. H.	Whitby.
Herold, Otto.	Waterloo.
Hilborn, W. W.	Leamington.
Kuestermann, O.	Waterloo.
Lamb, D. J.	St. Thomas.
Lewis, R. H.	Hamilton.
Macoun, W. T.	Ottawa.
Moyle, Harry.	Richmond Hill.
Mumby, Mrs. J. C.	Dunnville.
McCalla, W. A.	St. Catharines.
McMeans, A.	O.A.C., Guelph.
Nash, C. W.	Toronto.
Parsons, Wm.	Sarnia.
Pattinson, W. H.	Winona.
Peart, H. S.	Jordan Harbour.
Plant, Emile.	St. Jerome, Que.
Putnam, Geo. A.	Toronto.
Reeves, F. F.	Humber Bay.
Rittenhouse, S. H.	Jordan Harbour.
Rush, J. C.	Humber Bay.
Rush, J. W.	Humber Bay.
Scott, Rev. A. H.	Perth.
Sharman, J.	Byron.
Sharman, John.	Tambling's Corners.
Shirley, C H.	Collingwood.
Smart, W. J.	Collingwood.
Smith, G. L.	Toronto.
Stephens, L.	Orillia.
Stevens, Jas.	Todmorden.
Syer, N. C.	Hamilton.
Tregunno, Thos.	Hamilton.
Trick, Wm.	Ottawa South.
Trott, W. R.	London.
Vroman, Wm. R.	Woodstock.
Waid, C. W.	New Carlisle, Ohio.
Weaver, Chas. H.	Dunnville.
Whitehall, Frank.	London.
Wilson, J. Lockie.	Toronto.

SECOND ANNUAL REPORT

OF THE

ONTARIO

Corn Growers' Association

1909

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

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1910

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TORONTO

To the Honourable JOHN MORISON GIBSON, K.C., LL.D., etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the honour to present the Annual Report of the Ontario Corn Growers' Association.

Respectfully submitted,

JAMES S. DUFF,
Minister of Agriculture.

DEPARTMENT OF AGRICULTURE,
Toronto, 1910.

OFFICERS, 1910-1911.

Honorary President ..... T. S. Biggar, Walkerville.
President ..... J. O. Duke, Olinda.
First Vice-President ..... J. H. Williams, Fletcher.
Second Vice-President ..... Ed. Smith, Ridgetown.
Secretary ..... A. McKenney, Essex.
Treasurer ..... J. H. Coatsworth, Ruthven.
Superintendent ..... H. Smith, Ruthven.

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John B. Cousineau, Windsor.
Jas. McAuliffe, Maidstone.
K. J. Wilson, Essex.
R. W. Knister, Comber.
Eli Quenneville, St. Joachim.
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Geo. Langford, Kent Bridge.
Dan Buchanan, Florence.
William Blue, Palmyra.
D. Carmichael, West Lorne.
L. D. Hankinson, Grovesend.
Wm. Ford, Corinth.
A. E. Wark, Wanstead.

TREASURER'S REPORT.

Report of Treasurer of Ontario Corn Growers' Association for year ending February 4th, 1910.

Receipts.		Expenditures.	
Membership fees	$266 50	Cash for prizes	$541 00
Legislative grant	250 00	Travelling expenses	121 70
Essex County Council grant	200 00	Printing	201 70
Kent County Council grant	200 00	Postage	28 50
Municipal grants	165 00	Rent of building for Exhibition	40 00
Donations	150 00	Shelving	37 20
Advertising in Prize List	86 25	Corn for Exhibition (Essex and Toronto)	27 00
Corn sold Immigration Dept.	30 00	Exchange on checks	1 78
Lumber (shelving) sold	6 00	Auditing	2 00
Interest	6 34	Cash for prizes in three School Sections	15 00
		Express	11 00
		Fuel and rent of stoves for Exhibition	10 50
		Hotel and board bills	29 75
		Expense of Judge and Speakers.	103 10
		Stenographer	75 00
		Hardware Account	5 83
		Cartage	2 80
		Refund to Township of Romney.	3 50
		Labor and Police	16 50
		Incidentals	66 90
		Balance on hand	19 33
Total	$1,360 09	Total	$1,360 09

Examined and found correct,
this 4th day of February, 1910.

B. A. Smith,
Auditor.

ONTARIO CORN GROWERS' ASSOCIATION.

PRESIDENT'S ADDRESS.

J. O. Duke, Olinda.

I have great pleasure in welcoming you to this, our second Annual Convention. I am pleased to see such a large number present, and the enthusiasm marked in your faces. There is no doubt that we intend to go ahead with this good work. The object of these meetings is not only to teach how to grow better corn and more of it, but to show to you the real value of the land you possess. As it now stands the very poorest land in this country is the most valuable.

There is a farm near Leamington that was abandoned twenty years ago. The present owner told me that thirty-five hundred dollars was realized from thirteen acres in a single season, and that is the poorest land we have in Essex County and is selling for $200.00 and more per acre. We want to get our people up to the point where they can get the very best out of the land and to grow better crops, and I have no doubt but that we can make the land in this section just as valuable as the land near Leamington.

Last year I heard of land in this County on which they can grow $40 worth of corn per acre, which was sold at public auction for $23 an acre. This Corn Association is going to try and show the people of Essex and the people of Ontario that these corn lands are valuable, much more valuable than we think they are. I can go out with $50 and buy an acre of corn land, and if it was in the corn belt States of America it could not be bought for $200. Any land that you are selling for $50 an acre is worth four times that much.

I had a neighbor who wanted to sell his land for $50 an acre, but I advised him to drain it and put in corn, and he did so. He got $40 an acre for his corn the first year, and had all the small ears and fodder as a side profit.

You will find that if you tile your lands you will have a new farm. There is a reservoir of fertility in the soil here that has never been touched, because it is always flooded in a sea of water. The Executive of this Association realized this, and that is why we put on this tile question. The Clay Workers are holding their Convention in this town at the present time, and tile will be pretty thoroughly discussed.

I believe this meeting will be for the benefit of the farmers and make better crops and better farming. I think this is a work in the right line. Last year we had a Convention here, which was very largely attended and everybody who was present went home and said, "I am sorry I did not start to go sooner, I did not go until the second day," and those who did go on the second day regretted that they did not go earlier. I have noticed in the papers the accounts of the great development that is taking place throughout Canada, and you will find that this means commercial development. You will find that they are putting up a bridge in Quebec, costing ten million dollars, and on the G.T.P. that will cost two hundred millions. These are very necessary developments, but I consider that the greatest development is when you develop the people who inhabit the land. And if we, as Corn Growers, can undertake to learn more about our conditions and surroundings, we are gradually making developments that are worth while.

I was over in Omaha a couple of months ago at the National Corn Exhibition, and the people were telling how they grew corn. It was very interesting to me to find that in Texas they grow peanuts, and plow them under as a fertilizer. That would not be practical in Essex. In Connecticut they plow under fish.

A gentleman from Indiana got up and said that it would be folly for him to tell them how he grew corn, because he did not grow it in the same way every year. He said you must consider your conditions.

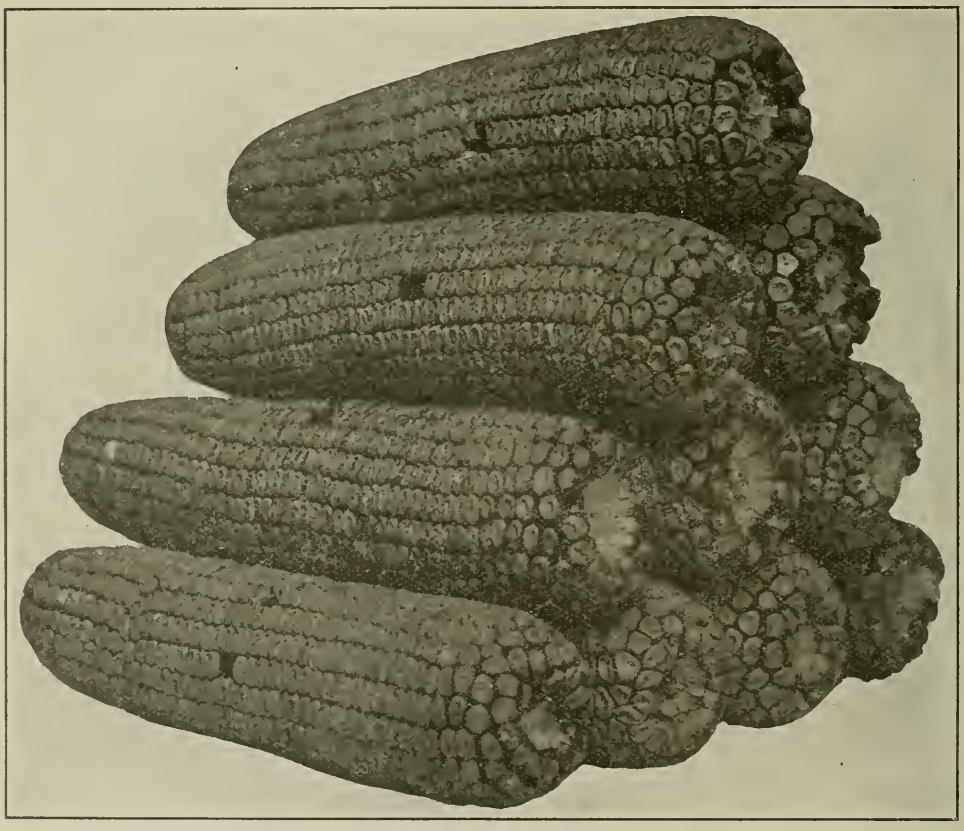
The particular condition here in this country is excess of moisture. We never have it too hot or too dry, but on these clay lands, the trouble is we cannot get on and work them when we should; we have too much moisture, and that is the reason we are going to give you some addresses on tile drainage. We are anxious that everybody should be here to hear Professor Day explain the reason why tile should be put in.

Exhibited by the Corn Growers' Association, Canadian National Exhibition, 1909.

I do not think that Canada should aspire to be a great military or naval power, but I think she can one day be a great agricultural country.

At the present time our Government is paying six million dollars a year to the militia, and they are now contemplating paying ten or twenty million dollars to a navy, but for the improvement of agriculture they are only expending one million dollars. I believe that if these figures were reversed we would come to the front so rapidly, that there would be no country in the world in competition with us. We have the vast West in which to grow wheat, and we have this country down here in which to grow corn to supply the dairymen of the east with their seed. We seem to be a link in the chain that will make this country prosperous. Canada is a corn producing country, but her corn is sold in the shape of cheese and butter. Canada has a great reputation for being a dairy country, and controls the markets of the Old Country in that line to a great extent. We pro-

duce products that make it possible to produce cheap milk. Hay is very expensive, and I am shipping hay into the Ottawa Valley at prices that are ruinous. I am shipping hay to dairymen near Toronto at prices that the farmer cannot afford to pay, and he must grow ensilage. Ensilage costs less than three or four dollars a ton, and it will produce more milk than hay. Dairymen in the eastern portion of Ontario find that American corn does not fill the bill. If you bring alfalfa seed from the United States it will not give as good results as Canadian grown seed because Canadian seed is adapted to our conditions. There is no plant in the world that is more easily affected than corn. If you bring the big white



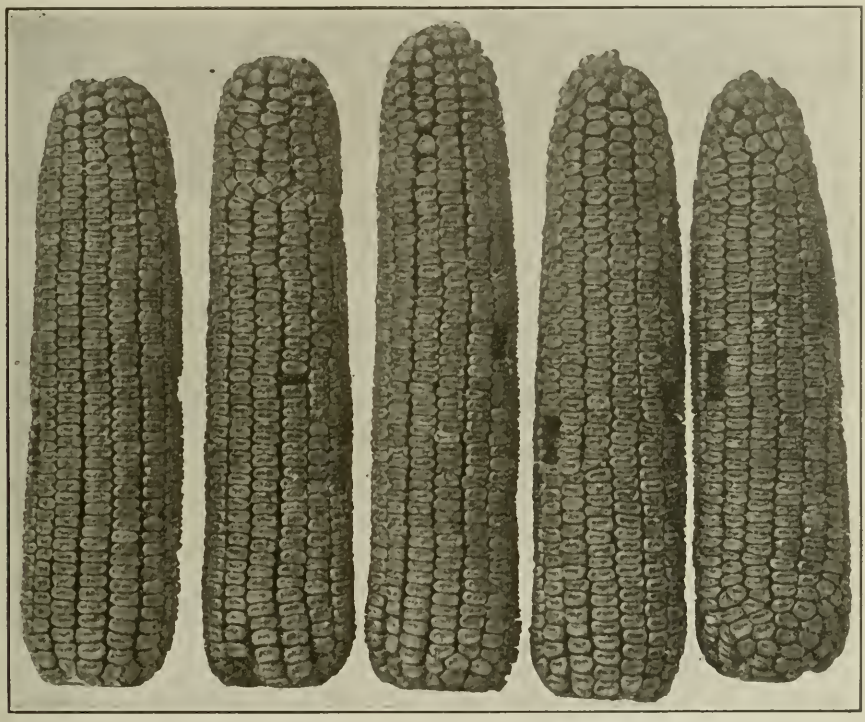
Grand Champion, 10 ears dent corn. Ontario Corn Exhibition, 1910.

corn from Kansas, you will get nothing but a coarse grass, but if that corn from Kansas is brought to Indiana, and then to Ohio, and then to Essex and to London, from London to Guelph, year after year, by the time it gets to Guelph, it is pretty well adapted to Canadian conditions.

You will notice in the show one exhibit of corn, and every grain is a different color. That is the old "Squaw" corn, that was found in the graves of the Indians by the Pilgrim Fathers, when they nearly starved that first winter. This is the original corn. All the different varieties have their origin in this corn, but by careful study, breeding and selecting, we have been able to grow corn that will produce better results, and fill more silos than anywhere else in the world. It behoves us to grow better corn and more of it, and that is the reason we started this Association.

The corn crop offers a great field for work. Take the man that grows fifty bushels of ears to the acre, he has a pretty small crop of corn, and all he can get, at a fair market price, is about $12.50 an acre; and that is about what it costs him to grow that corn, plant, harrow, and cultivate the land. A man who is getting one hundred bushels has from $35 to $50 an acre. If he has $50 an acre he has $38 profit.

Where land is not being worked on account of being too wet, it is impossible to grow good corn, and if you have fifty acres of land, I would advise you to spend $12 an acre on it and tile it, instead of buying another fifty acres, because every acre of land that you tile, will produce you twice as much as it did before. Therefore you can buy an acre of land for $12.00, and if you only



Sweepstakes, 5 ears dent corn in Junior Department, Ontario Corn Exhibition, 1910.

increase the yield by one-third, it would pay you. A little work in the corn field does a lot of good.

A great many people go into the corn field to kill weeds. You should go in to cultivate the corn. There is always plenty of work to do in the corn fields.

An exhibit like this never reaches such a state of perfection without the efforts of some individual. We have a man living in Essex, whom I think does not get enough credit for the work he does, and that man is Mr. McKenney, and I do not think anybody works quite as hard as he does, and I think we should appreciate his efforts. He has been a great benefit to the people of the County of Essex and to the whole Province of Ontario. And I am glad that there are others who think as I do upon that question. I do not think we want men of war to protect us, but I think we want men like Mr. McKenney and Prof. Klinck, men of peace, who stand for better crops and more of them.

REPORT OF THE SECRETARY, 1909.

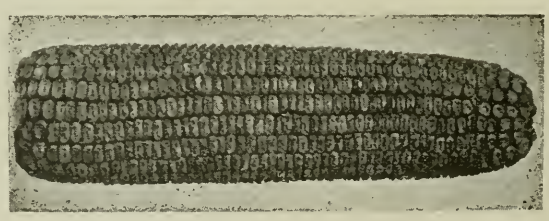
The past year, although the first in the history of the Ontario Corn Growers' Association, has been a very satisfactory one to the officers and directors of the Association.

The membership at the present time is 588, the members being mostly corn growers residing in the counties of Essex and Kent. A few have, however, come into the Association from the adjoining counties.

The work of the Association during the past year has consisted mainly in interesting the farmers of Ontario in the work of the Association. An effort was made to advertise Southwestern Ontario seed corn by displaying an attractive exhibit of corn at the Industrial Exhibition, Toronto. This was viewed by thousands of farmers and others, and did much to turn the attention of farmers in other portions of the Province toward Southwestern Ontario as a source from which good seed corn might be obtained.

An especially valuable feature of the season's work was the holding of several Rural School Corn Fairs.

A central school was selected in each of several townships, and a Corn Fair advertised for a certain date. All pupils residing within the township were



Grand Champion, single ear dent corn.
Ontario Corn Exhibition, 1910.

eligible to compete for prizes offered by the Association. The average number of exhibits at these fairs was well over one hundred.

These fairs have done more than anything else to interest the growers in the production of more and better corn, for by reaching the children the parents have invariably become interested.

The thanks of the Association is due to the Public School Inspectors and teachers who have given the movement their loyal support. The Exhibition and Convention has this year far exceeded the expectations of the Directors. The number of exhibits has increased from 123 in 1908 to 800 in 1909. The attendance also has increased in about the same proportion as the exhibits. An effort will be made during the season of 1910 to carry on experimental work with corn in the different districts of the Province, with the idea of finding out the most suitable varieties for ensilage purposes in these different sections.

A survey of conditions of corn production has been made in eleven different counties of the Province. Much valuable data has been collected, and it is the intention of the Directors of the Association to extend this work as rapidly as possible.

The Association is indebted to the different representatives of the Department of Agriculture for collecting this information in their respective counties.

The Association is at present in a prosperous condition, and I think we can look forward to an even more successful season during 1910.

The Executive have been especially fortunate in obtaining speakers for this Convention. Prof. C. G. Williams, Wooster, Ohio; Prof. L. S. Klinck, Macdonald College, and the different members of the staff of the Ontario Agricultural College have been very painstaking in their efforts to give assistance in solving the various problems in connection with the production of more and better corn.

CORN JUDGING.

Prof. L. S. Klinck, Macdonald College, Que.

I can assure you it gives me unusual pleasure to have this opportunity of addressing the corn growers of Ontario once more. Last year I spent such a profitable week in Essex at your first Annual Corn Convention that I have been looking forward with pleasure for almost a year to this meeting. The interest and enthusiasm aroused as a result of last year's meeting has evidently not decreased if the attendance at this opening session, and the number and quality of the exhibits in the rink, is any criterion.

I cannot say that I come with anything new or startling on the subject of corn. Fortunately the essentials for a successful convention are not necessarily new things. Every corn grower worthy the name already knows enough about his business to grow much larger crops than he has yet produced. What we all need is to be "jogged up" a little occasionally, to touch elbows with other growers and to have our minds stirred up by way of remembrance. The things we do, not necessarily the things we know, are the things that count for most.

In a convention such as this it is not so much a matter of someone giving a number of facts, interesting and instructive as these may be; what is needed is the spirit which characterized last year's sessions—the spirit of enthusiasm and buoyant optimism based on knowledge—the spirit which finds expression in an honest attempt to apply the facts learned, and which results in the production of "Better Corn and More of It."

Fortunately in last year's Convention this spirit of practical uplift was not confined alone to the men who produce corn. In fact, the movement in its initial stages was accorded more support by the business men of the town than by the corn growers themselves. As a result, the movement has meant more to this district than merely increased yields of corn. It has meant greater sympathy between the town and the country; it has tended to unify interests too often regarded as widely divergent; it has directed the attention of the people of Southwestern Ontario to some of the possibilities of agriculture, and it has lifted more than one man out of himself and given him a clearer conception of the scope and dignity of his calling. In a word, it has been educative, differing from a college course in degree only, not materially in kind.

When your President was speaking of hearing Essex mentioned at the recent National Corn Exposition at Omaha, I could not but be reminded of the interest aroused by the publication of this Association's first Annual Report. That report came as a revelation to thousands in Ontario and Quebec. These people were not aware that these counties were capable of producing such immense quantities of high-grade seed corn. By way of advertising Essex and Kent, as well as Ontario as a whole, that report did a great deal. Especially has it attracted the attention of dairymen in Eastern Ontario and Quebec. These men

are vitally interested in procuring seed corn of known breeding adaptability for the production of ensilage, and in these Lake Erie counties they now see the possibility of there being developed strains of acclimatized corns especially adapted to their requirements. With so many prospective buyers looking in this direction for seed corn, it behoves growers to pay the strictest attention to the production of seed of the highest quality. One or two careless or unscrupulous men in a district, who do business on the reputation of others, and who sacrifice future trade for present gain, can do more harm to the seed corn business at this juncture than a score of honest, painstaking men who know good seed and who prefer to make no sale rather than dispose of poor seed can do good. Now that dairymen have had their attention directed to Canadian-grown seed corn, it will be to the interests of all growers to study the requirements of the trade and to aim to supply exactly what is demanded. To direct your attention to the requirements of this trade, and the means by which the demand may be met, is the object I have in appearing before you.

I am well aware that some will differ with me as to what constitutes a good corn for seed, just as some ensilage growers differ with me as to what constitutes a good corn for the silo. As some dairymen produce an immense tonnage of sour ensilage from rank, succulent stalks, which bear little or no grain, and seem to prefer that kind to a smaller tonnage per acre of properly matured stalk and ear, just because it makes a bigger showing in tons, so some seed growers will insist on the big ear. Some few there are, who are especially favorably situated, who can mature larger ears with certainty but the number is so small as to constitute the great exception and not the rule. I do not favor a corn so large that it cannot be depended upon with certainty to mature in the average season. When one has made a careful study of the ten thousand ears which have been exhibited here during the past two years he will have had the most conclusive evidence in favor of the medium-sized early-maturing ear for the general grower.

In order that the subject of corn and corn growing might be presented and discussed in the most effective way, your directors have asked me to conduct a class in corn judging each morning. Last year provision was made for considerable speaking but no serious attempt was made to have the men in attendance do much actual work with corn. This year, however, your Executive has greater faith in your interest in this subject and has made ample provision for judging work. Good representative varieties have been secured in sufficient quantity to give each man a sample of five ears, so chosen as to illustrate the points to be touched upon during that morning's work. These samples will be changed each morning, always with a view to having them bear most directly upon the work of the day. At the conclusion of each morning's work in judging, a half hour will be devoted to a general discussion of the points noted. In this connection charts will be used to further supplement and illustrate the work. Such a presentation of the subject should prove more interesting and instructive than a series of illustrated talks could possibly be, for while corn is an interesting thing to talk about, it is infinitely more interesting to work with.

Corn naturally lends itself to a study of this kind. Those of you who have attended short courses on small grains know how difficult it is to make a satisfactory study of wheat or oats. If you take a head of wheat and rub it out you have perhaps fifty grains, but these bear no clear relation to one another. The grains are small, and unless the student is accustomed to studying them he cannot see the point the instructor is trying to make. As a result he has to draw largely upon his imagination, and frequently has reason to believe the instructor is drawing upon his.

With corn it is very different. Instead of fifty small, disconnected grains, you have frequently a thousand or more grains aggregated on a single cob and admirably arranged so as to lend themselves to a comparative study. After the characteristics of the ear as a whole have been determined, one finds the individual grains are of sufficient size to admit of a careful study, and so distinct are the lines of demarcation that, with the aid of an ordinary pocket knife, anyone may easily determine for himself seven distinct areas, which differ from each other in texture and composition, and consequently are of different feeding value. A good working knowledge of these, and other closely-related facts, is essential to successful corn growing and to a consideration of these our attention will now be directed.

(At this point a card explaining the terms used in describing an ear of corn was given to each man, together with a five ear sample, and by means of charts, bromides and samples of corn in the ear, an illustrated talk was given which enabled the men to familiarize themselves with the terms used in discussing the essential points of a good seed ear. This introductory session paved the way for three succeeding sessions in corn judging.)

TERMS USED FOR DESCRIBING CORN.

Shape of Ear.
- Cylindrical.
- Tapering.
- Very Tapering.

Length of Ear.
- Long (over 9½ inches).
- Medium (7½ to 9½ inches).
- Short (less than 7½ inches).

Circumference of Ear.
- Large (over 7½ inches).
- Medium (5½ to 7½ inches).
- Small (under 5½ inches).

Color of Kernel.
- Yellow.
- White.
- Red.
- Variegated.

Indentation of Kernel.
- Smooth.
- Dimpled.
- Deeply Dented.

Shape of Kernel.
- Wedge.
- Round.
- Square.
- Parallel-Sided.
- Pointed.

Length of Kernel.
- Long.
- Medium.
- Short.

Number of Rows of Kernel.
- Many (20 or more).
- Medium (14 to 20).
- Few (under 14).

Space Between Rows.
(At crown of kernel.)
- Wide.
- Close.

(At Cob.)
- Wide.
- Close.

Arrangement of Rows.
- Distinct.
- Paired.

Tips.
- Covered.
- Exposed.

Swell of Butt.
- Deeply Rounded.
- Moderately Rounded.
- Flat.

Size of Butt.
- Enlarged.
- Uniform.

Size of Shank.
- Small.
- Medium.
- Large.

Size of Cob.
- Small.
- Medium.
- Large.

Color of Cob.
- Red.
- White.

SCORE-CARD FOR SEED CORN.

Scale of Points	Possible Score	Ear 1	Ear 2	Ear 3	Ear 4	Ear 5	Ear 6	Ear 7	Ear 8	Ear 9	Ear 10
Trueness of type	10										
Shape of ear	10										
Color of kernels	5										
Color of cob	5										
Vitality or seed condition	15										
Tips of ears	5										
Butts of ears	5										
Uniformity and shape of kernels	15										
Length of ear	5										
Circumference of ear	5										
Furrows between rows	5										
Space between tip of kernels at cob	5										
Proportion of corn to cob	10										
Total	100										

Varieties of corn scored .....

Name of scorer .....

EXPLANATORY NOTES ON SCORE-CARD.

Trueness to Type.—10 points.

The ten ears in the sample should possess similar or like characteristics and should be true to the variety they represent.

Shape of Ear.—10 points.

The shape of the ear should conform to the variety type. The ear should be full and strong in the central portion and not taper too rapidly towards the tip. A full strong ear indicates strong constitution and good yield.

Color of Kernels.—5 points.

The color of the grain should be true to the variety and free from mixture. Differences in shade of color such as light or dark red, white or cream color must be scored according to the variety characteristics.

Color of Cob.—5 points.

An ear with a white cob in yellow corn, or red cob in a white corn should be disqualified, or marked zero, except in the case of White Cap Yellow Dent which may have either a white or red cob. This mixture reduces the value of the corn for seed purposes. It indicates lack of purity and tends towards a too wide variation in time of maturity, size and shape of kernels, etc.

Vitality, or Seed Condition.—15 points.

Seed corn should present a healthy, vigorous appearance and give evidence of being capable of producing strong, vigorous growth and high yield. Starchy, immature or pointed kernels are objectionable, as are also kernels with chaff or cob adhering to the tip, or kernels from which the tip cap has been removed, exposing the black covering of the germ. Blistered germs and shrunken blistered backs are the strongest evidences of impaired vitality.

Tips of Ears.—5 points.

In form the tip should be regular and the kernels uniform in shape and size. The proportion of tip covered or filled must be considerable. Long, pointed tips as well as blunt, flattened or double tips are objectionable.

Butts of Ears.—5 points.

The rows of kernels should extend in regular order over the butt, leaving a deep depression when the shank is removed. Open and swelled butts, depressed and flat butts with flattened, glazed kernels are not desirable.

Uniformity and Shape of Kernels.—15 points.

The kernels should be uniform in size and shape, making it possible to secure uniformity in dropping with the planter. The kernels should be not only uniform on the individual ear but also uniform with each ear in the sample. They should also be uniform in color and true to variety type. The kernels should be so shaped as to touch from tip to crown. The tip portion of the kernel is rich in protein and oil, and hence of high feeding value. Kernels with a large germ insure a strong, vigorous growth as well as richness in quality of the kernel.

Length of Ear.—5 points.

The length of ear varies according to variety type, and the characteristics sought for by the individual breeders. Uniformity in length is to be sought for in a sample, and a sample giving even length of ears should score higher than one that varies, even if it be within the limits. Very long ears are undesirable because they usually have poor butts and tips, broad shallow kernels, and hence a low proportion of corn to the cob.

Circumference of Ear.—5 points.

The circumference of the ear should be in symmetry with its length. An ear too great in circumference to its length is generally slow in maturing, and too frequently results in soft corn. Measure the circumference at one-third the distance from the butt to tip of the ear.

Furrows Between Rows.—5 points.

The furrows between rows of kernels should be of sufficient size to permit the corn to dry out readily, but not so large as to lose in proportion of corn to cob.

Space Between Tips of Kernels at Cob.—5 points.

This is very objectionable, as it indicates immaturity, weak constitution and poor feeding value.

Proportion of Corn to Cob.—10 points.

The proportion of corn is determined by weight. Depth of kernels, size of cob, maturity, furrows and space at cob all affect the proportion. In determining the proportion of corn to cob weigh and shell every alternate ear in the exhibit. Weigh the cobs and subtract from the weight of ears, which will give weight of corn. Divide the weight of corn by the total weight of ears which will give the percentage of corn. The percentage of corn should be from 85 to 86. For each per cent. short of standard a cut of one to one and a half points should be made.

QUESTIONS AND ANSWERS.

In the open conferences following the morning classes in judging, the following, among other questions, were asked:

Q.—How does this year's exhibit compare with last year's?

A.—Very favorably. The number of entries is much larger but the quality is not so good owing to the unfavorable season. A most gratifying improvement has been made in the selection of samples over those shown in 1909.

Q.—What variety is most popular for ensilage in Eastern Ontario and Quebec?

A.—Among flints, Longfellow, North Dakota and Compton's Early are perhaps the most generally grown. Early Leaming, Mastodon and White Cap Yellow are very popular dents. In our trials, Howie and Lenocher's Red have given good results, but these varieties are not widely known. Generally speaking, large growers do not confine themselves to any one variety. By planting Longfellow, Early Leaming and Mastodon they are assured of good ensilage even in the most unfavorable seasons. These corns ripen in the order given, so that the farther north and east we go the larger is the proportion of Longfellow used. Personally I think the less Mastodon grown in Eastern Ontario and Quebec the better. This corn gives an immense tonnage but the quality is generally poor. I think better results would be obtained if White Cap Yellow Dent or Howie were substituted for it.

Q.—How about White Cap Yellow Dent?

A.—White Cap has given splendid results, especially the smaller strains. Some of the large strains are too late for general growing. The principal objection I have to White Cap is its tendency to lodge and blow over. This is particularly marked where the corn has been planted thickly, and as the majority of our dairymen are generous in their use of seed, difficulty is sometimes experienced in cutting this variety. Notwithstanding this defect, White Cap is in the front rank as an ensilage corn.

Q.—What is the correct color of cob in White Cap Yellow Dent?

A.—White Cap being a variety which possesses blood of a white corn as well as of yellow, will naturally lack stability in color of cob. It is desirable, however, that the cobs in a given sample be either all red or all white.

Q.—How do you account for the fact that Leaming corn differs so widely in its time of ripening?

A.—Leaming is the oldest well-bred dent corn we have. It was first selected in 1826. Being a good yielding corn, and being well adapted to a wide range of soil and climatic conditions, many men have sought to adapt it to their conditions. The result is some strains of Leaming are very early while others are very late. This fact is becoming so well known that many growers are no longer satisfied to procure Leaming corn, but insist on having the strain of Leaming best suited to their requirements. For ensilage the Early Leaming is, over the greater part of Ontario, to be preferred to the Late Leaming.

Q.—How would it do to aim to get two small ears on a stalk instead of one large one?

A.—In dent corns I believe better results will be obtained if we confine our attention to stalks bearing but one ear. When we have done more to perfect our corn in other regards we may then more profitably direct attention to the production of two-ear stalks. It should be borne in mind, however, that two small

ears per stalk, while probably giving a larger yield, would necessitate more work in husking and subsequent handling, so that the gain in yield would probably be largely offset by the extra cost of production.

Q.—What relation does the dent sustain to the depth of kernel and time of maturing?

A.—With kernels of the same width and thickness, the rougher the crown the longer is the grain as a rule, and, with few exceptions, the longer the grain the later is the variety in maturing. Almost any deeply-dented corn will show a tendency to a less pronounced crease as one approaches the tip; while with ears having a dimpled dent, those at the tip are generally so round on the crown that they closely resemble flint types. If kernels are removed from the ear it will be seen that they decrease in length as the dent becomes less pronounced.

Q.—What kind of shank do you prefer?

A.—As a close relation exists between the shank and the cob, I prefer as small a shank as is consistent with strength. Long ones are objectionable, but short ones are equally to be guarded against as they cause the ear to stand too erect—a position which retards drying and tends to increase danger of injury from rain, frosts and birds. Some strains of Reid corn have shanks which are splendid examples of too fine breeding in this regard. So constricted have they become, because of the full round butt, that many of them are no longer able to support the ear. To such an extreme has this been carried that some object to these strains of Reid, especially in districts where the corn is husked in the standing fields, as the ears are apt to break off in late fall.

Q.—How do you prefer an ear borne?

A.—At the most convenient height for husking. Ears borne high on the stalk are generally late; those borne very low are small and early. In the dents, I prefer one which bends over gradually until the tip points downward. On such ears, when the husks open, the grain is still protected from the rain and from the direct rays of the sun—a position which is almost ideal for rapid drying out.

Q.—How many degrees of frost is necessary to injure corn?

A.—The more sappy the corn the fewer are the degrees of frost required to lower the vitality. I have seen perfectly dry corn come safely through a period when the thermometer dropped to 35 degrees below zero. That same corn, however, when green and sappy would probably not have stood more than five or six degrees. The influence of the water content of the grain in various parts of the ear is very apparent. The blocky kernels at the base are generally injured before the shallower but more exposed tip kernels, because of the fact that they are the last to dry out.

Q.—Will frozen corn germinate?

A.—Some maintain that frozen corn, if thawed out slowly at a low temperature will germinate, provided the grain has not been subjected to alternate freezing and thawing. I have not tried out this theory myself, but would advise giving it a wide berth. I know that altogether too much badly frozen corn is used by men who think their seed good, therefore I would not advise anyone to try that which he knows has been frozen. The Biblical injunction, "Avoid the very appearance of evil" is especially applicable here.

Q.—Which is preferable, corn cured in a fairly good circulation or in artificial heat.

A.—Heat and circulation are both essential. I would not use artificial heat if I could bring my corn through safely without it, as natural drying is the least dangerous and least expensive. If artificial heat must be resorted to, it should be-

remembered that a free circulation is absolutely essential to carry off all exuded moisture rapidly else the corn will either mould or germinate. Unless exceptionally good facilities are afforded for ventilation, the temperature should not be raised much above normal living room heat. In large modern seed houses artificial heat is used only when it is absolutely necessary, as better results are obtained when the corn is allowed to dry out naturally. Kiln-dried corn, however, properly cured has an advantage over that dried in the ordinary way, in that it will withstand unfavorable conditions better.

Q.—Why do you insist on fancy points, such as straightness of rows, uniformity of kernels, etc.?

A.—To my mind these are not fancy points in the sense the questioner means. They are evidences of good breeding. As far as they go, they are simply other names for good seed corn. What we want to get in judging is the ear which gives greatest promise of producing the most corn of high quality the next season. Anything that contributes to that end is not a fancy point; it is a practical point of great utility.

Q.—Is there any difference in the time of ripening between plants produced from tip kernels and those taken from the butt?

A.—Very little, if any, so far as my observation goes. It is quite a common practice to use tip kernels in improving the stand, where for any reason it is thin. This is done on the assumption that stalks produced from tip kernels ripen in shorter time than those from butt kernels. As a rule the stalks from tip kernels are finer than those from other parts of the ear, but as to the actual time of maturing the difference is slight.

Q.—If you fail to plant butts and tips, won't your ears soon run out at the ends?

A.—It is not a question of planting butts and tips to get full ears; it is a matter of selection. We want ears well filled out at both ends, but if we pay undue attention to these points there is great danger of shortening our ears, and so losing scale in the most valuable part. As it is easier to find short ears well filled at the tips than to find long ones well covered over, good judgment must be exercised to establish and maintain a proper balance or relation between the ends and the central portion of the ear.

Q.—Does immature corn give as strong germination as mature corn?

A.—Frequently the percentage of immature grains which germinate is as high as that of mature corn. Other conditions being equal, the growth from the immature is not quite so vigorous as that from the normally developed, although the difference is much less marked than the appearance of the two samples of seed would indicate.

Q.—How long can corn be depended upon to retain its vitality?

A.—Best results are to be expected from corn of the preceding summer's growing unless the season has been unfavorable. When properly stored, seed corn will retain its vitality for years. Naturally it will remain vital longer if stored in the ear than if shelled. This past season I planted corn four years old and had a good stand. From the lack of vigor in the resulting plants it was evident, however, that the corn was at least a year too old. When proper care has not been exercised in harvesting and storing last season's seed, I am of the opinion that seed of the 1908 crop, if carefully handled, will prove the more profitable, although it may be a day or so longer in coming up.

Q.—Have you ever used any of the patent germinators?

A.—Yes; the one tested worked satisfactorily, but unless a man has a very large acreage I doubt if it would pay him to buy one. The one before you is simple and in practice has given good satisfaction.

Q.—Is it possible to have an ear with too little cob?

A.—It is. Here is an ear handed to me by Mr. Coatsworth this morning which illustrates the point exactly. This ear would probably shell 92 per cent. of corn. What has heretofore been a strong point in its favor will probably lead to its undoing, if the present system of selection is followed, just as continued selection of full butts in some strains of Reid's corn proved a decided detriment. There seems to be a proper proportion existing between corn and cob which, if overstepped at the expense of the cob, leads to constitutional weakness and consequent deterioration.

Q.—Which takes up moisture the more readily, the grain or the cob?

A.—We know the cob is the last to give off its moisture, for though the ear may be very loose through the loss of water in the kernels in the early stages of drying, it becomes compact and firm as soon as the cob dries and contracts. If once thoroughly dry I should say the cob would be the last to absorb moisture.

Q.—Does Stowell's Evergreen make a less rapid growth than the average dent corn, and is it more difficult to cure?

A.—Stowell's Evergreen has always been a vigorous grower with us. We have cured our own seeds for several years, but find that it requires more careful handling than many of the dent corns.

Q.—Which type of planter do you prefer, the edge-drop or the round-hole plate?

A.—For carefully graded corn the edge-drop will give the better satisfaction; if the sample is lacking in uniformity I prefer the round-hole plate. One reason for our low average yield of corn is the fact that we do not get a sufficiently uniform stand. This can be rectified only by paying closer attention to the grading of our corn, and then using that type of planter which will enable us to put into each hill the number of kernels we desire. A few years ago I made a test of graded and ungraded corn in edge-drop and round-hole plate planters. One hundred and sixteen good ears were used and eight thousand eight hundred checks or drops were counted. Each check was then planted in the field exactly as the planters had dropped the corn in the test. The results showed that with graded and ungraded corn, when the plates best adapted to each were used, the edge-drop plates gave 3.4 per cent. better stand than the round-hole plates, and the increase in yield from the use of the edge-drop plates was five and a half bushels per acre.

CROP ROTATIONS FOR CORN.

C. A. Zavitz, Professor of Field Husbandry, Agricultural College, Guelph.

Six hundred and eleven thousand, one hundred and thirty-five acres of land in Ontario were used for the cultivation of corn in 1909. Of this area, practically 42 per cent. was in the counties of Essex, Kent, Elgin, Middlesex, and Lambton. Essex had 13.5 per cent. of the total area used for corn, and 25 per cent. of the area devoted to corn for the production of ripened grain, and Kent had 12 per

cent. of the total area and nearly 20 per cent. of the area used for the production of corn for husking. When we realize the important position which the corn crop occupies in the agriculture of the south-western part of Ontario, we can understand the value of the consideration of this crop in determining the most suitable rotation for the best results. The Secretary of the Ontario Corn Growers' Association has done well to bring this subject before the Convention for its consideration.

I hope every farmer present has given a good deal of thought in the planning of a suitable rotation of crops for his own farm, as it is one of the exceedingly important features of good husbandry. The best rotations are those which are the most suitable for individual farms. It is really a matter for each farmer to study out for himself, after taking many things into consideration. It is sometimes advisable for a man to have two or even three rotations for the different parts of his farm. It is, therefore, impossible to have any one rotation of crops that would be the most suitable for every part of Essex County, where there is a considerable variety in the soil, in the method of farming, etc. If this is true for Essex County, it is certainly true for the other counties in the south-western part of Ontario, and also for the rest of the Province which grows corn to a more limited extent. It is my object, therefore, to consider certain principles in connection with the rotation of crops and to make certain suggestions, after which I hope we will have a good discussion regarding the adaptability of certain rotations in furnishing the most desirable results.

Advantage of a Good Rotation. A properly planned rotation certainly has many advantages; such as, the distribution of labor throughout the year, the furnishing of a variety of crops, the lessening of the risk from heavy loss, the opportunity of keeping the land free from weeds and destructive insects and diseases, the improvement of the mechanical condition of the land, and the maintenance or improvement of the fertility of the soil. Different kinds of crops possess different characteristics; such as the length of their roots, the season of the year in which the growth takes place, the length of the time required for growth, the power of assimilating plant food, the amount of certain food constituents required, and the amount of residue left on the land in the form of roots, stubble, leaves, etc. These are all important factors which need to be taken into consideration in arranging the most suitable rotation for any particular farm.

Corn in the Rotation. It is very important indeed to introduce a cultivated crop in the rotation. In many parts of Ontario, noxious weeds are becoming very troublesome. One of the best methods of keeping the land comparatively free from weeds is the use of a short rotation which has a cultivated crop. Thorough cultivation greatly increases the yields of the crops, helps to destroy both the weed seeds and the weeds themselves, and makes an excellent preparation of the land for the succeeding crop. Those sections of Ontario, therefore, which can grow corn to good advantage can make use of a most valuable crop in connection with their systems of rotation.

A Leguminous Crop in the Rotation. While it is important to have a cultivated crop in the rotation, it is also exceedingly important to have a leguminous crop as well. The legumes, such as clover, peas, beans, etc., have the power by means of their root nodules of fixing the free atmospheric nitrogen and of utilizing it throughout the plants. As nitrogen is the most expensive of the plant food elements that the farmer has to buy, this power of the leguminous plants is of the utmost importance. Not only does the addition of the nitrogen secured in this way add to the value of the fodder produced, but it also has a marked influ-

ence in improving the fertility of the soil through the decay of the roots. In order to illustrate this point, I will refer to the results of experiments which we conducted at the Ontario Agricultural College at Guelph in the years 1900, 1902, and 1903, in which the comparative value of the sods of Common Red clover and Timothy were determined. After the crops were removed from the plots, the land containing the roots of these crops was plowed. On the sods of 1899, winter wheat was sown in the autumn of the same year; on those of 1901, barley was sown in the spring of 1902, and on those of 1902, corn was planted in the spring of 1903. The average yields of the crops produced per acre are shown in the following table:

Sod	1900 Winter Wheat	1902 Barley	1903 Corn
	Bushels	Bushels	Tons
Red Clover Sod	60.4	31.6	23.3
Timothy Sod	42.1	19.7	17.9

In 1902 the test with Common Red clover and with Timothy sods was repeated four times under somewhat different conditions. Barley was sown on each of the eight plots in the spring of the year. The detailed results of yields per acre are very interesting, and are as follows:

Tests	Red Clover Sod	Timothy Sod
	Bushels	Bushels
Number 1	25.3	13.4
" 2	36.2	20.1
" 3	31.7	19.6
" 4	33.2	25.7

In comparing the mechanical conditions of the soil on which Common Red clover and Timothy had been grown, it was found that there was a marked difference resulting from the action of the roots of the different crops on the soil. The sod of the clover was loose and friable, and that of the Timothy was close and comparatively stiff or hard.

Where various leguminous crops, such as clover and peas can be grown so successfully as they can in Ontario, it is important that a leguminous crop should have a place in the rotation in practically all instances.

Rotations. It is my intention to simply mention a couple of rotations and to leave the meeting to name others and to carry on the discussion.

A rotation which is used extensively on the Experimental Farm in connection with the Agricultural College at Guelph extends over four years, and is as follows: 1, corn; 2, small grains; 3 and 4, clover and timothy. The grass seed mixture used is Common Red clover, 6 lbs.; Alsike clover, 3 lbs., and Timothy, 4 lbs., making a total of 13 pounds of seed per acre. Usually the crop in the third year of the rotation is used as hay, and in the fourth year as pasture.

In Essex County I find there are about 91,000 acres of corn, potatoes, roots, and peas; 108,000 acres of small grains, and 101,000 acres of hay and pasture. As there are 82,708 acres of corn in the county, the most common rotation in Essex,

therefore, might reasonably be one extending over three years and consisting of corn, small grains, and clover. This is a most valuable kind of a rotation, containing, as it does, practically all of the advantages of a rotation of the very highest type. There could, however, be many additions to and variations from this to meet various conditions arising from the kind of soil, the condition of the soil, the condition of the subsoil, the size of the farm, the kind of farming practised, the proximity to market, etc.

Q.—How does Timothy affect the soil that it degenerates it so much in one crop?

A.—I think there are two or three reasons. One is that it is a surface feeder—it simply feeds on the surface. Another is that it is a robber of the soil; it does nothing to the soil and it takes everything from it. Clover has two distinct features; one is that it sends its roots so deeply into the sub-soil that it gathers plant foods far beyond the surface and brings up the mineral matter, and the other is that it has the power to make use of the free nitrogen of the atmosphere. There are bacteria that must make use of the nitrogen just as we make use of the oxygen, and when they use the nitrogen it is conveyed through the whole plant. It has been proved beyond doubt that this bacteria has a wonderful influence in increasing the yield per acre, and we are not only drawing from the sub-soil but from the atmosphere. Only the legumes will do that, such as clover, peas, beans, alfalfa, vetches and crops of that kind. Corn, roots, timothy and the grains, except peas, will simply take the plant food already in the soil, and will draw nothing from the atmosphere.

CORN IMPROVEMENT.

Prof. C. G. Williams, Wooster, Ohio.

I count it a great honor to be called before you this afternoon to address you upon this subject.

When I left the Ohio Experimental Station yesterday forenoon, there was a fearful storm brewing, and my fellow members suggested that I had better go out and buy a fur overcoat before I went to Canada. I did not do so, but if I had done so I would have been in good company. The only difference I see here, as compared with a Northern Ohio audience, is a few more fur coats than we are in the habit of seeing. But I do not see that you need them any more here than we do in Ohio.

There are many things upon which the most of us would agree, and one of these things is the statement that there is a splendid chance for improvement in our corn crop. The average yield of the corn crop in the United States stands at 25 8/10 bushels per acre, this year's average—and I am talking of shelled corn—and that is a ten year average yield. For my own State, the average yield is 35 bushels to the acre, and the states of Illinois and Indiana were a bushel or so less, and Iowa some three bushels less. From these figures it would seem that there are plenty of chances for improvement, at least in the United States. I have not heard your official figures, but I dare say it is higher than ours in the corn belt. For I remember that New England with her careful rotation and tillage exceeds the prairies of the West in her yield per acre.

While my mission here is ostensibly to bring a little information to you, I expect to take back to Ohio more than I brought from there. It is not an unusual thing for us to go to Ontario for agricultural information and experiments, and occasionally for some other things. We have had your Professors Klinck, Day and Zavitz, and have gotten a whole lot of good from them.

It is my privilege this afternoon to call attention to some ways by which we may improve these crops. I cannot guarantee that my facts will apply in every instance to your conditions, I leave that to your judgment, but I bring to you some of the work of our Ohio Experimental Station. There are a great many ways in which we can improve this crop. One of the ways is to improve the fertility conditions, and the second is crop rotation.

I want, in the first place, to give you some facts relative to this point. At the Ohio Experimental Station for the past seventeen years, we have had a uniform tract of land upon which we have been growing corn in continuous culture. Corn after corn after corn for seventeen succeeding years, and a few rods away we have been growing corn in five years' rotation, corn, oats and wheat, clover and timothy.

I want to show you the difference in the production, in the yield of corn under these two systems of cropping. In the first place we used no fertilizer. These experiments were undertaken upon land that had been rented for twenty-five years before the station took charge of it, and you know what continuous renting does to land. Where we have been growing corn without any fertilizer continuously for seventeen years, during the first five years of continuous corn we averaged twenty-five bushels per acre. The second five year period it dropped to 16.8, and the third five year period it dropped to ten bushels—corn after corn, without any manure or fertilizer.

A few rods away from this work we had corn growing in the rotation of which I spoke still unfertilized. These plots have had no manure for seventeen years, and you note the yield is practically on the dead level for the whole period, 31 bushels per acre, but I expect after a time it will come down.

Some of you would wonder what would happen if in the continuous culture we had put back upon the farm each year manure. We did that on portions of these plots, using five tons of manure each year, and the yields the first five years were 45 bushels per acre, second five years 40, third five years 34.6. You see the five tons of manure won't save a crop, it is heading downward. To compare with that we will take 3.2 tons of manure applied only in five year rotation. In this five year rotation we do not apply the manure each year. We only put it on two crops of the five, the corn and the wheat; they get eight tons each year, sixteen tons for the five years. Look at the yield, we started off a little lower than in the continuous culture, showing probably that the land here was not quite as good. But look at the second year, we have advanced from 40 bushels to 49; look at the third year period from 49 to 50, going up instead of down. Where we depended upon the commercial fertilizer for the plant food, you note substantially the same result that we had in the use of manure.

ROTATION VS. CONTINUOUS CULTURE.

FIFTEEN YEARS' WORK WITH CORN.

System	Treatment	Yield per acre		
		1st 5-year period	2nd 5-year period	3rd 5-year period
		Bushels	Bushels	Bushels
Continuous	Unfertilized	25.3	16.8	10.4
Rotation (5 year)	Unfertilized	31.9	30.8	31.1
Continuous	5 T. manure	43.1	40.1	34.6
Rotation (5 year)	3.2 T. manure	40.7	49.5	59.8
Continuous	Com. fert.	38.9	39.1	28.0
Rotation (5 year)	Com. fert.	41.3	49.9	54.1
				12-yr. av.
Rotation (3 year)	8 T. manure	Once in three years		58.2
Rotation (3 year)	8 T. manure, 320 lbs. acid phos.	Once in three years		64.4
Rotation (3 year)	Unmanured			33.9

CORN YIELDS IN THE UNITED STATES.

Twenty years, 1870—1889, 25.6 bushels per acre.
Twenty years, 1890—1909, 24.9 bushels per acre.
Ten years, 1900—1909, 25.8 bushels per acre.

We do not recommend a five year rotation as ideal. We have secured better results with a shorter rotation. We have results here in the three year rotation of corn, wheat and clover. In these rotations eight tons of manure is applied once in three years, and that is giving a twelve year average yield of 58 bushels. These same eight tons of manure reinforced with 320 pounds of acid phosphate on twelve years' average yield has raised it from 58 to 64 bushels.

While manure is the best fertilizer it is not perfectly balanced. We have a surplus of nitrogen and potash in comparison with phosphorus and the general tendency of our farming is, of course, to remove the phosphorus. We grow wheat and sell it; wheat bran is largely phosphorus. We grow animals, and the phosphorus leaves the farm in the bones of the animals, and we cannot get the phosphorus back as we can the nitrogen with clover and other legumes. We have simply to buy the phosphorus and put it back.

I believe here is one chance for improving our corn yield; farming with more careful system of rotation. There is need enough for improvement. With this great discussion that we have had in the States for the last ten years, you would almost think we had doubled the corn yield. But when you get down to hard figures, gathered officially by the Government, we find that we have made very little improvement upon production. In the twenty years' average yield of corn in the States, from 1870 to 1889, 25.6 bushels. The next twenty years, to 1909, we actually produced a little less, and during the last ten years we have got back to where we were twenty years ago.

You have already heard the question of drainage and tillage discussed; these are two exceedingly important lines and I will not take them up again. But if I

may judge of the lay of the land between here and Windsor, no other one line of improvement offers greater inducement to the people here than drainage. And the same thing is true in Ohio and we are buying tiles and getting good returns from them.

I want to call your attention next to the matter of getting busy in the spring and planting your corn on time. We have a great many people who are afraid they will plant the corn too early. It is possible, of course, to plant the corn too early, but where your land is tile drained and works up, as it will, a little earlier than if it was not tile drained I venture to say that there is ten acres planted too late, where there is one acre that suffers from being planted too early. We have been planting corn at our station weeks before any other person would think of planting corn. And then after ten days planting another plot side by side to see what effect this early or late planting has upon the yield, and I want to give you some figures along that line.

EARLY AND LATE PLANTING OF CORN.—Three-year Average Yields.

Date of Planting	Yield per acre. Bushels	Per cent. of Moisture	
		1909	1908
April 27—30	74.9	26.5	16.5
May 6—10	77.5	27.4	16.5
May 14—20	75.7	28.1	18.6
May 25—30	66.5	29.9	23.9
June 2—5	48.1	37.8	30.0

Of course this test will not apply to your conditions exactly, but the facts will. Our dates are probably a little earlier, still I am not so sure of that. These are three years' average yields of corn, planted 21st of April, gave us an average yield of 74.9, and the same sort of seed planted a little later has averaged a little more 77.5. Planted the middle of May it drops back to 75; planted 25th to 30th of May drops back to 66; planting June 2nd to 5th has averaged 48 bushels.

There are a whole lot of men within hailing distance of where this corn was planted, but they did not think of planting corn until June, and you can see what they are missing. I do not say but what June is all right for you here; you can think that over; but the average man plants too late. He is waiting until it gets warm, but the fact that it is warm on the 25th of May is no guarantee that it is going to be warm a week later. I would just as soon put a coat and a pair of mitts on a man and set him on the corn planter if the ground is in good condition and plant the corn. Supposing it gets frosted once in a great while; I would rather have corn frosted in May than in September.

I remember about three years ago we began planting it on the 5th of April; we had some nice warm weather and the corn came up about the 3rd or 4th of May. It stood six inches high. Then we had a genuine frost which froze the water ¾ of an inch thick, and you would almost have thought that corn was ruined, but if you had come round in a week after that frost, you would not have known it had ever been frozen. I do not mean that it was six inches high. It was two or three inches high, and as good a color and as thrifty as any corn we have ever had, and yielded just as much as corn that was not up to get the frost.

Q.—Did you cut the tops off?

A.—No, sir; did nothing at all; they died right off, and a new growth came on and it was all right.

Q.—Does it get ripe any sooner?

A.—Yes, when you weigh up your corn in the fall, what have you got in a bushel of corn? Forty pounds of cob and grain and a whole lot of water. I do not care how dry your corn is, there is a lot of water, and in immature corn there is a good deal more water than in ripened corn.

If you want to grow water, plant your corn any time. If you are after dry matter in your corn, plant as early as you can.

Another matter, our yields of corn depend very largely upon the number of plants which we have grown on an acre.

AVERAGE FOR FOUR YEARS, 1904, 1906, 1907, 1908.

No. of plants per		Average Weight of ears	Percent. of		Yield of shelled corn per acre	Pounds stover per	
Hill	Acre		Nubbins	Barren plants		Acre	Bushels of corn
1	3,555	.68	10.3	2.2	31.47	2,484	78.9
2	7,110	.621	15.8	2.4	50.26	3,390	67.4
3	10,665	.545	19.5	4.0	59.28	3,994	67.4
4	14,220	.463	28.4	7.4	61.95	4,495	72.6
5	17,775	.402	39.8	11.8	60.29	4,969	82.4

This was the average result of four years' work with different thicknesses of planting, and I want to call attention to the yield. Where we had one plant per hill we had a little over thirty bushels of shelled corn per acre. From two plants per hill we had 50 bushels, three plants per hill 60 bushels, four plants per hill 63 bushels, five plants per hill the total yield, dropped back, we had a very large portion of nubbins. The yield of corn fodder or stover, as we sometimes call it, varied of course. One plant per hill twenty-five hundred pounds, two plants three thousand pounds, three plants four thousand pounds, four plants four thousand five hundred pounds, five plants five thousand pounds. Of course the ears are larger and better looking with a thin planting. With one plant per hill there is not much tendency for the plants to be barren. We had more barrenness as we increased the stand, and when we struck four or five plants the barrenness increased at a fearful ratio.

Q.—Still you have more corn?

A.—Yes, four plants give us more edible corn than any other. If I were asked my opinion, I would have to say that it was about half way between three or four plants. Three plants per hill gives 10,665 per acre, four plants 14,000. I think we put in about twelve thousand plants per acre, and by having the hills three feet apart one way and forty-two inches the other and three plants to the hill, that will give us just about twelve thousand plants per acre.

Q.—For ensilage would you plant late so as to get enough water in it?

A.—I do not think there is any trouble about getting enough water in ensilage corn. I prefer to get it ahead and get the water dried out. There are a great many foolish ideas afloat in regard to ensilage. It is very seldom that corn is too dry to go into the silo after it has been cut.

Q.—If it has been frosted?

A.—I have put it in at the station when it had been frosted, and it kept nicely; there is lots of moisture in the stalk. The drier the ensilage is, the sweeter it will keep. Some of our people fill their silos the second time, and put in shock corn. In that case I would put in some water.

Q.—Would it not be better to get it a little too green than too ripe?

A.—I would like to see the man who could convince me that it was too ripe? We have gradually been putting it in riper and riper until our farmers are putting it in just about in a condition that they like to have it shocked up.

There are some things that have to be done again and again. They perish after using. You fertilize or manure your corn this year, but it is no sign that you will not have to do it again next year or in three or four years. Tile drainage once done ought to be done forever. There are few things that will help us in our crop production that are more permanent.

Half a century ago a man in the State of Pennsylvania, walking out into his wheat field, discovered a solitary plant that looked different to him than any other plant he had ever seen. He gathered that plant and multiplied it, and to-day all over the States and over Canada we are growing Fultz wheat—the wheat discovered by Abraham Fultz by chance. Once Fultz wheat, always Fultz wheat. And a number of bushels have been added to the wheat crop by that happy discovery. We can all improve the heredity of our plants, and the matter of better varieties is of much importance.

Now, when I suggested that some of us might improve our corn yield by getting better varieties, I want just to say that I am not thinking of sending a long way from home for these varieties.

We read in our farm paper about a man who won some three or four thousand dollars at the Corn Show in Omaha with the best ten ears of corn, and the farmers in Ohio are pretty apt to think that the only thing they have to do to duplicate his success is to get some of his corn, and hosts of them are sending to Indiana and Iowa for corn. That is the worst thing that the corn growers can do. Corn is not a crop that can be moved long distances like wheat and oats. So that when I suggested the fact that a variety would suit some of us, I meant that you should canvass the home country for these better varieties before you look elsewhere, and if you have to go some little distance from home, don't go for any considerable amount of seed, or you may reduce your yield and the quality of your produce.

The Corn Association of Ohio is doing a line of work that I want to mention right here. We have a great many local societies in different parts of the State, and in the past season we conducted some thirteen or fourteen variety tests of corn. We got the people of one-half dozen townships to send in the variety they were growing, and on an acre or two of ground we would have 42 to 50 different varieties of corn, and we did not fail in a single test to find variation in yields of these different varieties, running all the way from 30 to 80 to 90 bushels, and others as low as 30 to 40, these varieties being grown by different farmers in the immediate locality. I am speaking of shelled corn.

Some one spoke here this morning about the farmer being wedded to his own corn. You get these varieties together at a central point and hold a field meeting when the corn is ripe, and then you will find some farmers apologizing for their corn that happens to be at the bottom of the list; the season was bad or something.

It is a pretty good lesson. I have discovered that no matter how firmly wedded a man may be to his own variety, if there is another variety that yields him twice as much, he is usually willing to get a divorce from that variety to which he has been so long wedded.

I send over every year to Iowa and Illinois and Kansas for the best seed corn that can be sent to me, and we grow these varieties side by side, and I like to show them to the farmers as they come into our field meetings in August and September. It emphasizes the necessity of getting varieties that are adapted to the existing conditions. This last season the best Reid's Yellow Dent that Kansas could furnish us yielded 57 bushels. The best Reid's Yellow Dent that Illinois could furnish us yielded 62 bushels. We are a little nearer Illinois than Kansas. The best Reid's Yellow Dent that Southern Ohio could furnish us crept up to 70 bushels; that is still a little nearer home.

Our own Reid's that we have been breeding and selecting for ten years yielded 79 bushels. If I were making a score-card for the selection of seed corn I would put down adaptibility first, and I would give it 30 or more points out of the one hundred. That is what you want to think of—adaptability. I do not care how bright the ear, if it is not adapted to my farm you cannot give it to me; I do not want it. You are growing corn for the bushels of shelled corn you can get per acre.

Supposing you and I had the best variety of corn that could be had. What then? There is something more. A good many of you are, I suppose, in the dairy business. You have learned that the selection and breeding is not the only thing to be considered. Some of the poorest cows in this world are pure-bred scrubs, and it is the same in the plant world.

We had in our station barn two cows of the same breed that stood side by side. They consumed the same sort of feed, and within a few pounds the same amount of food during the year. When we balanced the books we found that one of them had made a net profit of $50 above her feed, while the other one had made only $5. The difference was in the individuals, and it is the individual that counts in this world.

Ears of corn are good or bad as the result of heredity or environment. You and I want the seed corn that is good, because of something it has inherited, if you please, rather than one that is good because it was made so by environment. I can take that ear of corn that sold for $150 last week, and I can plant it on the best land in Essex County, and will only grow measley nubbins from it. If you do not believe that put ten kernels in a hill and see what you get. It is environment that makes these prize ears of corn, nine times out of ten, and if you are going to take these prize ears and grow other prize ears from them, you will have to bank upon the environment you can give and not upon their heredity.

Right in the same corn I have gone into a plot that had one plant per hill, and I have selected 25 of the best ears that I could find in that plot, and I have gone to those plots where there were five plants in every hill, and I have selected 25 of the best hills I could find. In the following year I have planted these 25 best ears, which were 50 per cent. larger, side by side under the same identical conditions as the ears selected from this plot where there were five in a hill. Which do you suppose came out ahead? There was not a great deal of difference, but the ones from the five plants to the hill were ahead. They were not as large when planted. What made these ears small was because they were planted five in a hill, and what made the others large was the conditions of growth. If I had to select my seed corn where the corn was growing one plant per hill, or five plants per hill, I would prefer to select it where it was growing five plants per hill, and there is mighty good reason for it. Where corn is planted one plant per hill, almost any plant will produce a good ear, but where they are planted five plants to the hill it is only the very best and most vigorous that will come to the front. The corn is too thick,

and nature has got to kill off some of them. Which is it going to kill off? The sturdy and best? That is not the way this world was brought to its present standpoint. It kills off the weaklings. If you will skim the cream from these two plots you will get the highest grade of heredity where you have the adverse conditions.

Q.—Don't you think three or four would be better than five?

A.—I have to say what I find to be the actual conditions. The Nebraska Station has been planting four or five kernels to the hill. I give you that for what it is worth. I do not say that you ought to go ahead and make these conditions. That is the principle that nature works on. I would never go below three; if I was to vary from that I would take a larger number.

Burbank, the great plant grower, has a way of weeding out his plants. He grows seedling potatoes. He will have a million seedlings, and he sows them broadcast as thick as the hair on a dog. He sets nature fighting there, and after the fight is over he picks out the winners. So you go into the Corn Show and pick out these fine looking ears, and they are fine, and you have some fine ones here. When you look at them ask that ear, "What made you so good?" That is what you want to know. If it is something that is inside of it, you cannot get too much for it. If it is something that is outside of it, it is not one-half or one hundredth part as valuable. There are some men, I am sorry to say, that are good because of something outside of them. On that account they are pretty hard to be bad. But you make the conditions favorable to be bad and they will be bad. There are men that can walk down a street when there are no saloons easy enough and not get any liquor; but let there be a dozen or twenty-five saloons on the street and it is a different matter.

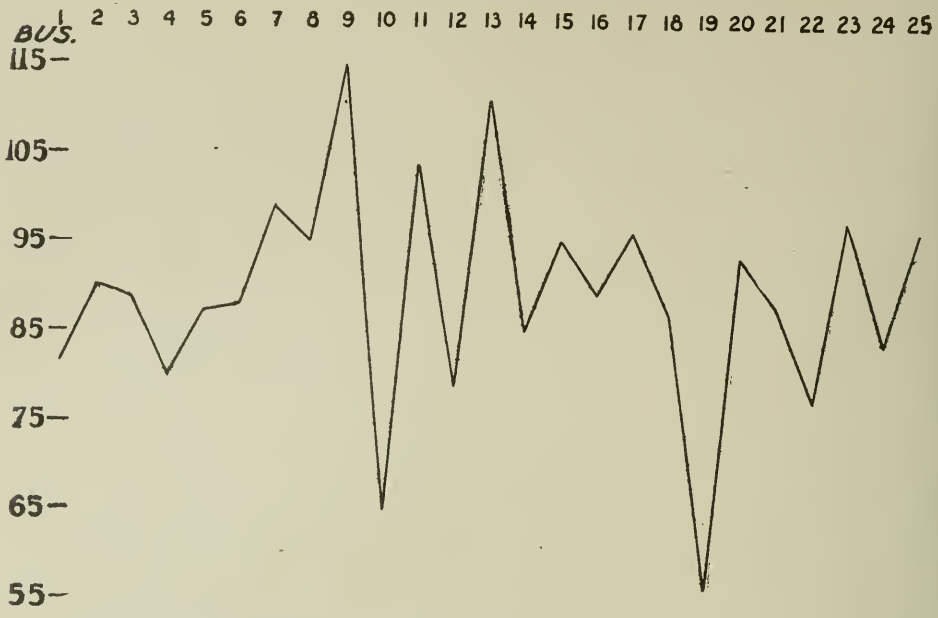
Inherited values in plants and animals are not easily discovered externally. We have much better dairy experts than we have corn experts. They have been working longer; and yet the best dairyman in America will miss it very often when he goes out to buy a cow. It is hard to discover these inherited values that are not on the outside.

What are our dairymen doing to-day? They are doing differently from what they were twenty-five years ago. Twenty-five years ago when a dairyman went to buy a cow he would run around to see how long her tail was, and then he would look in her ear to see how much wax there was in it, and then look at her face. But now they have come to the milk scales and the Babcock test, and that is what we are beginning to do in this corn breeding. "You look good, but are you good? We will plant you an ear to the row and see if you are good or not."

Corn Breeding. I want to talk to you a little about corn breeding. I do not expect that you are all going home to put out an ear test of corn, but if three or four will do it a lot of good will be accomplished.

Here is a herd of twenty-five cows that have not been tested. We put them to the test and we find there is one that will make thirteen or eighteen pounds of butter a week, and they will run all the way down to five pounds. Here are twenty-five ears of corn. I do not care of what variety or what stamp of variety. We put them to the test, planting each ear three and a half feet apart, and what do they do? Exactly like the cows, they vary in just the same way; why I cannot tell you. I cannot tell you why the wife of one man here can bake good bread, while the wife of another man cannot. We find these variations in nature, even in children of the same family. One may get to be President of the United States and the other may land in the penitentiary. You cannot tell why it is, but it is your duty or mine to discover these superior individuals and make use of them.

EAR-ROW TEST OF CORN, 1905. (O.P.B.A. No. 17.)



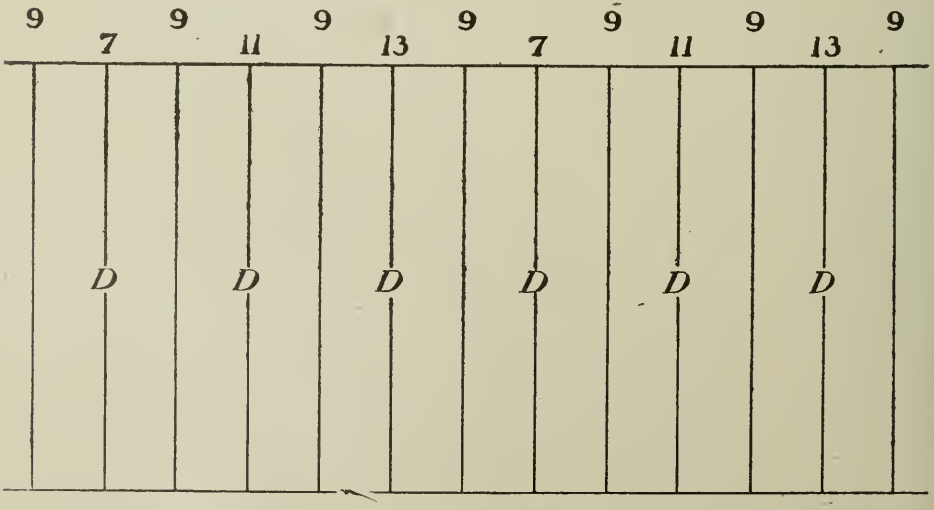
In 1906 the following ears were crossed in an isolated breeding plot: 17 – 9, 17 – 13, 17 – 11, 17 – 7.

The lines on this chart represent the ups and downs in the yield of 25 different ears of corn of the same variety planted side by side, and as a matter of fact were planted in duplicate, and this is an average of two sets of rows.

Here is one ear that yielded a little below 85 and then another 114. You would not get this in ordinary field conditions. In these tests we have a perfect stand.

ISOLATED BREEDING PLOT,

Where the remnants of the best ears of the preceding ear-row test are crossed.



Q.—Which of these cars would you prefer?

A.—Number nine.

Q.—How many stalks in the hill?

A.—Three stalks in the hill. Right opposite number nine is the second poorest of the bunch, and the pollen would blow over, and we would get some of the blood of these very poor cars when we select corn from this row. Our practice is not to plant the entire ear in the spring; we plant part of it, and we number the ear so that we will not make any mistake. After it is completed and we have discovered which ears produce the best, we have some of the original car, and we will take the left overs of these four best cars and start strains the following year. You can handle them in two ways. As a farmer I would take three or four best ears, shell them and mix them together, and plant them away from other fields, far enough to avoid pollenization and plant and perpetuate the blood of these three best cars. As an experimental Station, we prefer to be a little more accurate, and we will keep these cars separated. The second year, we plant them in a little patch in short rows, and we plant every other row with number nine. We are going to use that as the sire, and on the alternating rows between number nine rows, we will put these others—seven, eleven and thirteen—and then, when the tassels begin to come on, we will de-tassel all of these rows right through, except the number nines. Then, you see, by saving the seed of these de-tasseled rows, we get a direct cross between the two rows, and number nine will be the sire in every case. We will have a cross of nine on seven, nine on eleven, and nine on thirteen, so we have three distinct strains. As a farmer, I do not believe I would go to that trouble. We have a few farmers over in the States who are doing that, and one farmer has for two or three years been putting on the market, strains bred in this way, and he got $5 a bushel for the seed.

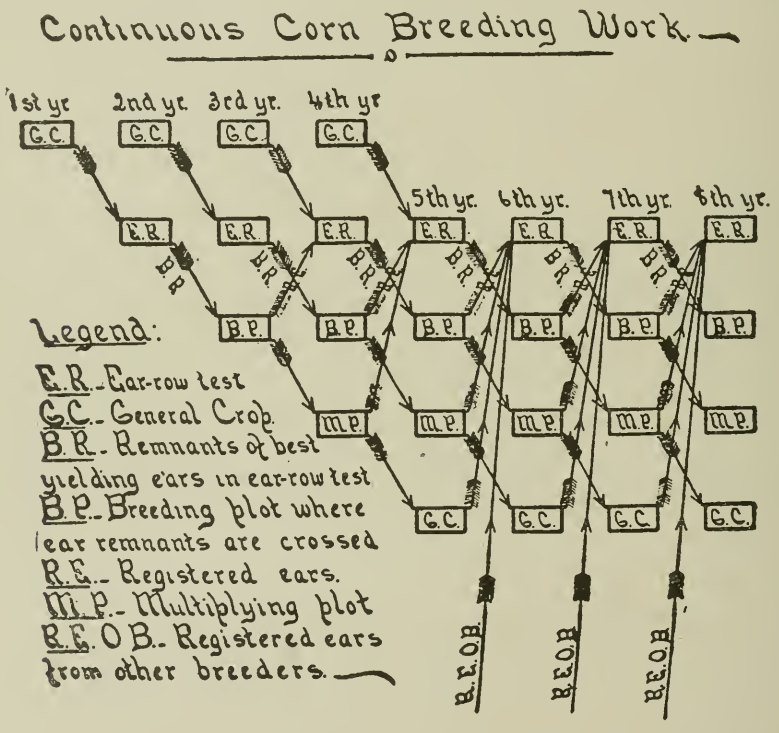
EAR-ROW TEST, 1907. AVERAGE BOTH PLOTS. (O.P.B.A. No. 54.)

	BUS.
Average yield of 9 pedigreed crosses, 33, 34, 38, 41, 42, 48, 51, 55, 56.	78.01
Average yield of 18 field selections	71.01
Gain for pedigreed crosses	7.00
Inbred pedigreed ears, 37, 47, 52	63.41
Below crosses	14.60
Average yield of 9 plant selections, 31, 35, 36, 43, 44, 49, 53, 58, 60	72.98
Average yield of 9 ordinary selections, 32, 39, 40, 45, 46, 50, 54, 57, 59	69.02
Difference	3.96

Q.—How far are these plots from the other corn?

A.—That will depend a little on the direction of the wind; our prevailing winds come from the west and south-west, and if the breeding plot was to the east and north-east of the field, I would want it at least eighty rods away.

In three years we will have a production of three different strains. I want to show you what they do in the third year. I planted some of this pedigreed seed in single row tests, as compared with better looking corn brought in from the field. We have not as large yields this year because it was a poor one. It is not the actual yield you go by in corn breeding, it is the comparative yield. I do not say that an ear must yield ninety bushels in a year, and I will save the ear that yields ninety bushels and throw the others away. Some good seasons you will save a lot of poor ears. The average of the nine pedigreed grains was seventy-eight; the



average of the eighteen field selections was seventy-one, a gain for the pedigree strains of seven bushels.

Q.—What have these pedigree strains been doing since that?

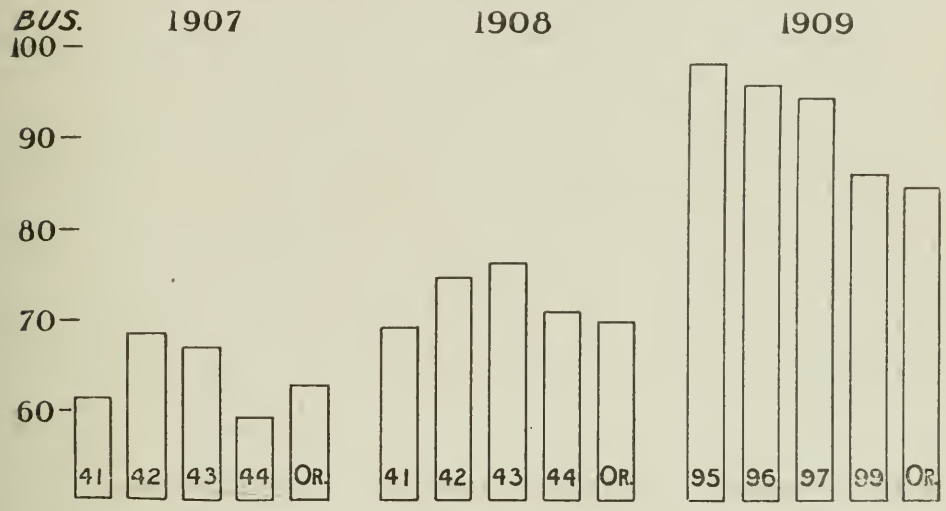
A.—That same year we took samples and tested them alongside of the original corn; the height of the column indicates the yield. You will find in plant breeding, the same as in animal breeding, that not all the animals that have good parents turn out to be good. A whole host of trotting bred animals cannot trot. The crosses are better than the original. In 1909 we had the grandchildren of these first ears that I showed you of 1905, and here is what we got. One of them came close to one hundred bushels of unshelled corn. The first generation we found results five to seven bushels ahead. The second generation twelve to fifteen bushels.

I do not think that we have any right to assume that we get our best corn in our first twenty-five or fifty ears. We have got to keep this up. The second year

we generally get twenty-five ears more, and conduct another test, and then go to another breeding plot and another multiplying plot. We keep that up year after year. We get the best test from the pedigreed corn, which gets better and better all the while. We are getting registered ears from other breeds, and if one is good enough the next year it goes into our breeding plot, and I will use it as the sire.

Plants may be improved by improving their surroundings—that is, the condition in which they are grown, and by improving their heredity. What you get as a result of better breeding does not cost you much.

TENTH-ACRE PLOT TEST OF PEDIGREED STRAINS.



41 = 17 - 9 × 17 - 7
42 = 17 - 9 × 17 - 11
43 = 17 - 9 × 17 - 13
44 = 17 - 9 × 17 - 9

54 - 34 = 1 ear of 43
54 - 48 = 1 ear of 42
54 - 55 = 1 ear of 43

95 = 54 - 44 × 54 - 34
96 = 54 - 44 × 54 - 48
97 = 54 - 44 × 54 - 55
99 = 54 - 44 × 54 - 44

THE PRODUCTION AND REGISTRATION OF HIGHLY-BRED SEED CORN.

L. H. NEWMAN, SECRETARY C.S.G.A., OTTAWA.

As one who is deeply interested in the production of seed corn, I appreciate this opportunity of meeting so many members of the Ontario Corn Growers' Association and others who are interested in this great question of corn improvement. We meet here to-day with enthusiasm. Many of us have come to realize the possibilities which lie within the reach of men to get more useful plants, and we have met here to increase our knowledge and to strengthen our convictions. The great forerunner of any achievement worth while is enthusiasm. Where enthusiasm is lacking, the power is stopped and stunted, and we are likely to make very little progress. The Ontario Corn Growers' Association is fortunate in having among its members so many enthusiastic growers, who appreciate something of the possibilities of better methods, and who realize that the full producing power of an acre on the average farm has not yet reached its limit, or nearly reached its limit. I

read in your report that the main object of your Association is to encourage the extension of the area devoted to corn growing, and also to encourage a greater interest in the matter of seed corn growing generally. Such a movement is commendable, and speaks well for the statesmanship of its members. You have in the Counties of Essex and Kent approximately 158,000 acres devoted to the growing of corn. This year, I believe, your yield was a little better than seventy-five bushels to the acre, although some years would be perhaps a little higher. This yield is not what it ought to be were better methods of cultivation and better systems of drainage and better seed corn brought into active service. As an Association you have had it in your power to improve conditions in this section of the country, by encouraging your growers generally to adopt better methods.

I wish to speak more particularly of the work of the Canadian Seed Growers' Association, and I also wish to say a word on the methods of registering seed. While many of you are no doubt acquainted with the aims and objects of this Association, there may be others who are not so familiar with them, and for the sake of the latter I wish to state, as briefly and as clearly as I can, the exact position occupied by this Association in Canada. I also wish to define the relationship which exists between the Ontario Corn Growers' and the Canadian Seed Growers' Association. Since some of you may be inclined to say that the work of our Association duplicates that of the other, with the very first word I wish to dispel from your minds any such idea. The Canadian Seed Growers' Association is an organization covering the whole of Canada, and embracing all crops, including corn, and requiring of its members certain definite work which requires that a system of breeding be followed, which system, in the case of corn, is one which is recommended for the use of all corn growers, whether members of our Association or not, and one which is identical in all essential particulars with the system that your Association recommends. The Canadian Seed Growers' Association keeps a careful record of the work performed by its members, and in the course of time issues certificates of registration for seed which has been grown in this manner, no matter whether this seed be wheat, oats, barley or corn. It also inspects the work of these members during the growing season, and aims to instruct by personal visitation the various members engaged in the work and try to instruct them in better methods of corn growing generally. As a registration for plants, it corresponds with that which has been in use in Canada for registering animals. As a good many of you know, practically all pure-bred animals of all good breeds in all the Provinces are registered at a central point in the Dominion at Ottawa. Such an arrangement gives greater unformity and stability to live-stock breeding in Canada as a whole. The seed which comes from the plants which have been grown according to our directions are also registered at the headquarters of the Canadian Seed Growers' Association, which is under the jurisdiction and direction of a Board of Directors chosen from all the Provinces. These records, or these certificates, are essentially national in character, and are accepted by buyers of seed in all the Provinces, and are recognized as valuable by buyers of seed in any country in the world which up to the present time have come to us for such seed. We welcome all such movements as that which has been championed by your Association here, as preparing the ground for the more systematic work required by us. We expect that the interest which you will create through your meeting, exhibition and the like will stimulate many to go on a little further and take up the systematic work leading to the registration of their seed. Your facilities in interesting the ordinary grower are admirable, and you will no doubt create an interest in this matter in local centres throughout these counties. To put the matter more clearly, any corn grower may become

a member of the Canadian Seed Growers' Association and a member of the Corn Growers' Association, and may reap the benefits of the Association without in any way reducing the usefulness of either.

These two Associations may work side by side and hand in hand, with the closest co-operation and to their mutual advantage, and to the advantage of the corn grower who is fortunate enough to be a member of each.

In beginning the work of corn improvement, the first important consideration is that of variety. We find at the present time that the most of our varieties of corn are very badly mixed. We find that there is a great multiplicity of types. The same thing is evident in wheat, oats and barley, but not to the same extent, because corn is a cross-fertilized plant, and when we speak of the variety of corn we really mean the general crop, in which the prevailing type may be defined in general terms. In the report of the meeting held here a year ago, Professor Zavitz, of Guelph, dealt quite fully with this matter of variety, and pointed out the importance of making careful choice, so that I shall not need to go into it further, other than to recommend that you study it very carefully.

Systems of corn breeding which have been adopted in North America differ considerably in methods of procedure, but all recognize, with a few exceptions, the same general principles.

The system in use in Canada by the Canadian Seed Growers' Association is somewhat simpler than the majority of those recognized by our friends across the line, and for that reason the greater number or proportion of corn growers adopt that system, and it seems to be accomplishing the object for which it was intended, and that is the final test of any system. The basis upon which the Canadian Seed Growers' Association established its system is on what we call the ear to the row test, that is, we have a special breeding plot, on which each single row is planted with corn from the single ear. There is the accumulated evidence of some twelve or fifteen years to prove that the productive capacity of single ears of corn differs very widely in a great many cases. Some ears will produce 50 per cent., and even more, than others will produce. The aim of the corn grower is to isolate these best producing ears, and that can only be done by some system of breeding. The idea that because an ear appears good it will give good results is liable to be a delusion and to create a disappointment. The quality or virtues of an ear of corn depends upon two things. First of all, it depends upon the condition under which the plant which produced that ear was grown. Secondly, it depends upon the breeding of that plant. It may sometimes happen, and doubtless it has often happened, that a poor plant produces an ear which appears good, but is forced to do so by extra fertilization or extra moisture. But it is not desirable that that ear should be used for seed purposes, because we find these acquired virtues are not likely to be transmitted to offspring grown under normal conditions, so that you will see the only safe place to select corn is from the growing plant. The Association recommends that the breeding plot be used to facilitate the discovery of these valuable ears. We recommend a plot of not less than twenty rows in number, with fifty hills in each row, each of these rows to be planted with corn from a single ear. In preparing this plot we should select probably about twenty of the best appearing ears we can find. When the stalks begin to tassel, the corn grower is advised to go through the plot and examine the different plants carefully for scrubs, mongrels, and degenerates, and remove the tassels from these before they show their pollen. Our aim in doing this is to insure a strong, vigorous parentage for the ears which we will use next year for seed. By removing the tassels from the male plant on your plot, you prevent

their fertilizing the plants which otherwise would produce good ears. That leaves the parentage strong, healthy and vigorous.

This process, when continued for a number of years, will repay the breeder by increasing the yield and reducing the percentage of nubbins and by reducing the percentage of barren plants. We can give you many instances where we have accomplished results along this line. The Association recommends that careful record be taken of the performance of these individual rows, but we do not require that work to be done, because it necessitates a great deal of extra work, but we feel that it would pay a grower to do it. In the first place, it is one of the very best trainings he can possibly have in the importance of close observation and examination of details. If he does not take these careful notes he is likely to pass over a great many very important points, so that we invariably encourage them to do it; and, on the other hand, it assists us at headquarters in establishing a degree of greater merit than we can establish were these reports not taken. In taking up this work it is desirable that you adopt some system of recording the performances of these rows, and to facilitate that, we issue special forms, which may be used in taking these notes. One form is sent into headquarters and the other form is kept by the grower for future reference. In selecting for next year's breeding plot we advise that 40 or 50 of the best ears be chosen, and in selecting these, rather than select from 2 or 3 of the best, we advise selecting from between 5 and 10 of the best rows. If you are going into this with the view of registering seed corn, we recommend that these be laid away to plant next year in the usual way on a plot which is isolated from other varieties. Corn cross-fertilizes for a considerable distance, and it is very important that these plants be kept away from fields of other varieties, and that is one of our greatest difficulties in this work to insure that the producing plant be maintained in purity. Sometimes growers exercise every precaution to have their plants isolated, only to have their efforts frustrated by their neighbours planting some other variety alongside of it. This difficulty can be overcome by means which I shall not take time to describe. That is a matter that can be taken up with the individual grower

There are two or three things which should be observed in selecting seed corn. In the first place, ears which are too large, especially in the dent varieties, should not be chosen. Ears exceeding 9½ to 10 inches in length and more than 7 inches in circumference should be passed over. No ears should be taken from a plant which shows an indication to produce more than two ears.

I would like to take you with me on a little tour of inspection I made through this country last summer, in judging seed plots and fields entered in the field competition. In all, there were 73 individual plots or fields inspected, and a great many careful notes were taken on each inspection, because it was not only my intention to judge and place the awards in the competition, but I wished to get as much information as I could from the growing crops.

You have here at your exhibition an excellent exhibit, one which you may well feel proud of, but that represents the cream of your crop, it does not represent what you would call the average of your crop. There are a few things that I came across this summer, which, I think, it would be of value for you to know. In discussing the standing of the fields of corn grown in Essex or Kent, it is only fair to state, in the beginning, that the standing of these crops is not what it would have been in a normal year. The late cold spring kept the planting two weeks or a month behind, and as a result, a great deal of the corn did not mature thoroughly, while crops grown on tile-drained soil were really more desirable and more satisfactory in general standing, and even here the crop was not what it would have been in a

normal year. These, however, are conditions over which the average corn growers have very little control. There are difficulties which may be controlled to a very great extent, and I shall speak of them more particularly. I refer specially to impurity of varieties and lack of uniformity in type. It is safe to say that the majority of corn growers throughout this country realize the importance of purity, and they have done all they possibly could to insure purity; but, as I said before, the grower is often frustrated by the growing of corn by neighbours. On the other hand, it is perhaps quite safe to say that a good many growers do not regard mixing of corn as a menace to a successful growing method. In fact, I have been told by growers that they intend mixing varieties, with the idea that they would secure larger yields. The practice of mixing corn in this way is sure to develop a greater multiplicity of type than it already possesses. We have already sufficient mixture, and it is desirable, therefore, that we should try and get a variety as pure as possible, because the crop is likely to mature more evenly, and one of the great difficulties of uniformity in maturing is due a great deal to mixing different types. Some types mature perfectly when others are in the milk stage, so that when varieties are allowed to mix, you are simply inviting lack of maturity in your corn crop. Furthermore, this is a very undesirable and a very unsafe practice, to think of selecting seed corn from a field which has been mixed in this way.

Regarding uniformity of type, it was found that many fields were made up of a great many different types, thus indicating that the choice of seed is not receiving the attention that its merit demands. As an instance of this I found one field of corn said to be Leaming, containing at least three distinct types which would differ in yield quite as much as different varieties of wheat, oats or barley, which would naturally be expected to mature in this field, but some of the earlier types of corn were well matured, and some of the late were still in the milk.

In many fields of White Cap I also found a great diversity of type. I found a very great difference in the way the different types were maturing. There was a lack of uniformity in maturing. In the White Cap Yellow Dent I found a great many fields in which there are white cobs or red cobs; you should select them for one or the other. Some men have the impression that a red cob would produce a greater yield than the white cob, and they had selected with this idea in view. The percentage of barren plants found throughout these fields was not nearly so large as I expected, but the percentage of nubbin-producing plants was as high as between sixty and seventy per cent. of nubbins. This was due to the season. I found fields where the prevailing type did not grow too large, and consequently they had the smallest percentage of nubbins and the largest estimated yield. In certain breeding patches I found that some growers were not accomplishing what they hoped to accomplish. In one particular case of a grower in this country, who imagined that by getting a very large ear he would increase the productive capacity of his type, the result was that I found this year the prevailing number of rows of kernels in the type he was selecting was from 20 to 22. An ear of that sort is too large, and is borne too high on the stalk, and is a material hindrance to the harvesting of that crop with a machine. This is not the most important point. The point is that such an ear is too late in maturing. The general products of a plot of that kind did not mature fully this year. This particular grower was also selecting from plants which had a tendency to produce two ears; the result was that I found twenty-seven per cent. of the plants he had planted producing, or trying to produce, two ears of corn, but the ears that were being produced were of a very undesirable type and borne very high on the stalk. An interesting fact in connection with this work is that this grower whose work I have just cited got his seed origin-

ally from another grower two or three years ago, who has also been selecting from his breeding plot, and he selects from a smaller ear, and selects only from plants producing one or two ears which are borne lower on the stalks, and selects ears with no more than eighteen rows. This year I found his corn was maturing perfectly; he had only fourteen per cent. of stalks on his plot that were trying to produce two ears of corn. Any attempt at short cuts to larger yields by selecting very large ears from stalks which produce more than one ear is a dangerous practice in the case of the dent varieties. Happily, this fact seems to be generally known throughout the corn-growing sections, and we do not find the evils of false ideas throughout the counties devoted to corn to the same extent that we do in other places. The variation in yield between rows of corn in breeding plots was found to be considerable in the plots of corn by some of our best growers. We found the difference in yield to be one-third less than yields in other rows, and that these rows were planted with ears which looked alike and which had been selected in the same way. The idea of the breeder is to isolate the best ears, and once he has them isolated he can then continue selecting in such a way as to keep up his yields according to the condition of his soil, etc., and keep the variety from degenerating.

The counties of Elgin, Essex, and Kent produce more than half of the husked corn of the whole Province, therefore this part of Ontario will always be the main source of seed corn of these varieties for this Province.

The opportunities for specializing along this particular work by practical corn growers, growing an article which will register under our regulations, are abundant, and we recommend that the corn growers generally take up this sort of work, going into it systematically with a view of ultimately having their seed registered, and realizing the advantages of this sort of work. There are at present a great many good corn growers in this country, and I found last year some excellent growers who are growing a splendid article, and they are offering it for seed, but their work is very little known. They are working in comparative isolation. Our Association is trying to do what it can to discover the best corn growers, and to encourage them to affiliate themselves with us and adopt our system, so that we will be in a position to vouch for the quality of the seed they are producing and give them the public recognition which they deserve. The seed is not distributed to the advantage of the growers, and certainly is not distributed to the best interests of the country as a whole. Therefore, you will see the place this Association occupies in encouraging these good growers to associate themselves in a combined effort to increase and improve the corn-growing situation generally. I need not point out the advantage of this procedure. The demand for seed corn at the present time is very substantial, and there is a growing demand all over Ontario for a high-class article. The shrewd buyer at the present time is looking for seed corn that has been grown under some special system, and that can be certified to, or vouched for, by some institution or organization which has the confidence of the public as a whole. These buyers are looking to secure the seed on the ear, because they understand full well that, where corn is supplied in that way, the grower cannot throw in nubbins and undesirable seed. They must supply a reasonably good type of ear, and they prefer to get it on the cob, in order that they may keep it to the last possible moment before planting, because corn acts very much better in that way.

In closing I would like to summarize three or four points, and the first is, that it will pay any grower who grows corn in any considerable quantity to operate a seed plot in some part of a field. Whether he is a member of any association or not, it will pay him to do this in order to maintain the purity of the varieties, and in

order that he may eliminate a good many of those undesirable types, and therefore insure more uniformity in the maturity of the product.

Second. Another point is that he should aim to develop pure strains, a uniform type, and have every stalk in his plot producing a desirable type of ear.

Third. There is an opportunity of extending your work as corn growers by specializing and taking up the growing of seed corn systematically.

Fourth. That certificates of registration be issued in the course of time to members of our Association who are growing seed of any sort, who have grown the seed according to our directions, and who have built up standards of these types to comply with the regulations as at present laid down.

Fifth. Certificates are valuable as an assurance to the buyer of seed corn as to the quality of seed he is getting.

Sixth. In this great movement of corn improvement the Ontario Corn Growers' Association has a great work to do in instructing growers generally as to proper methods. And my last word would be to give this movement the greatest possible support.

Seventh. That the Canadian Seed Growers' Association can co-operate with the Ontario Association, and with all associations and movements which tend to improve the conditions of corn growing, and make the business a more profitable one.

It is to be hoped that the germs of improvement which are being scattered, particularly at the present time, will infect and spread, and that a great many corn growers will not only be better corn growers, but will become corn breeders in the fullest sense of the term.

I wish the Ontario Corn Growers' Association, and the great cause which it seeks to advance, every success.

TILE DRAINAGE AS A FACTOR IN CORN GROWING.

Prof. W. H. Day, O.A.C., Guelph.

It affords me a great deal of pleasure to come to Essex to talk to the visitors at the Corn Show and the delegates of the Clay Workers' Association on the subject of drainage, which, as you all know, is a subject which has become a part of my life during the past few years. I do not now talk on the subject of drainage the way I did five years ago. I was brought up on a farm in the County of Victoria, and we knew what it meant to see a field, that would not grow more than a quarter of a crop, turned into a field that would grow a bumper crop of anything. And I thought five years ago, when I first began to talk drainage, that the people knew the benefits of drainage as I knew them myself; but after five years of experience, coming in contact with people in all parts of the Province, I have come to the conclusion that the benefits of drainage are not thoroughly known by the people. Some of the people are very much alive to the benefits, but others are not so much so. I think perhaps there is no part of the Province where the majority of the people need to have the benefits of drainage manifested more than in this County of Essex. I know there are a large number of farmers who are actively engaged in draining their farms, but there is a large proportion of the people who do not know the actual benefit of drainage. For five years we have been making drainage surveys in various parts of the Province. Any man who has a difficult drainage problem to solve may

have the assistance of one of the drainage officers, who will make a survey of his land and lay out a plan, and tell him how much grade he has to the hundred feet. This will be done if you will make application, and all you have to pay is the travelling expenses of that man from the College to your place; and if two or three surveys are made at the same time, then the expense is divided up. For five years we have been making these drainage surveys, and until last spring we apparently had very little at the College to show for our labours. But in the spring of 1909 I wrote to every man for whom we had made drainage surveys in years gone by, and put these questions to him: "Have you put in any of your tile, and, if you have done so, will you kindly write and tell us your experience? Tell us how much it cost you, and tell us how many bushels per acre you got, and send us some samples of the grain, to show how the crops are growing." And a large number of these people wrote back and sent us reports, and I am going to begin talking on the benefits of drainage to-day by letting these people talk, by letting the men who put in the drains say a few words to you. I will just take them alphabetically.

WILLIAM BELL, Washago, Simcoe: "I drained eight acres you surveyed for me in 1907. It had produced nothing previously. Last year I grew a fairly good crop of oats on it, which yielded 33 bushels per acre. Following is a statement of outlay and results:

"*Cost* of draining 8 acres, $290.90—$35.11 per acre, including a 6-inch main to drain other land as well as this.

"*Returns*—33 bushels oats at 45 cents—$118.80, nearly half the cost of drainage."

Then we have not counted anything for the straw, and straw is worth something, and if your market here is like it is in Guelph, you can sell a ton of straw for $8. This man would get a ton of straw per acre; that would be $4 more to be added, which would make $150 off ground which never grew much of anything before.

J. H. CLARE, Chapman, Hastings: "Fields that previously were unfit for crops at all can now be seeded on even date with high land; and, while before they grew nothing but coarse grass, now they yield per acre: Hay, 2 to 3 tons; oats, 40 to 50 bushels; barley, 30 to 50 bushels; corn, 14 feet high."

I have no doubt that some of you people know the example I am going to give you. There were twelve acres in this particular piece, but I am making it eight acres, so as to have a good comparison, because right across the fence there were eight acres undrained. I am going to take eight acres drained against eight undrained, a difference of $419 in favour of the land which was drained, nearly four times the cost of the drainage, from one crop.

JAMES CLAYTON, Cedar Springs, Kent: "In 1901 I drained 8 acres, at a cost of $112, or $14 per acre; 8 acres right across the fence was not drained. In 1902 both fields were sowed to beans; 8 acres drained land gave 302 bushels, which sold for $456; 8 acres undrained land gave 24 bushels, which sold for $37."

"Well," you say, "that is a bean crop. We are interested in corn." All right. In 1903 both of these fields grew fall wheat.

Now, if you people had 20 bushels of wheat to sell to-day, you would get about $22 for it, and half a ton of straw would make it up to $26. In 1904 there was drained land on both sides of the fence. The man on the other side could not stand it any longer; two crops were enough for him.

T. S. BIGGAR, Manager, Walker Sons, Walkerville, Essex: "On our drained land this year (1909) we had 80 bushels of shelled corn per acre, while the undrained gave us only 56 bushels. Of oats we had 66 bushels on drained and 37 on undrained. In 1908 the drained land gave us twice as much as the undrained. We have tilled 87 acres this year, and purpose tilling much more next year."

I will just give you the facts about a piece on the old homestead where I first got interested in drainage. My father, in writing the facts to me a little while ago,

said this: "I drained a 10-acre field some fifteen years ago, at a total cost of $145, or $14.50 an acre, the drains being four rods apart and two and a half feet deep. It was a muck soil, from a foot to a foot and a half deep, underlaid with a heavy clay. Before draining it was the wettest field on the farm, and would grow only hay and oats, and never more than a half crop of them, and often not that, and was never sowed before June. Since draining it is the second driest field we have, and will grow a full crop of anything that can be grown on the high land of the farm. It has been sown in April every year but one since it was drained. The drains paid for themselves in two years. If I were draining the field again I would put a drain every two rods, for the crops are always better right over the drains than half-way between."

Now, I would say regarding that example, that these drains were 2½ feet deep, because we could not put them deeper; the outlet went over an outcrop of rock, and, carrying back our grade from that outcrop of rock, we could not go more than 2½ feet for a fall. We would put it deeper if we could; then it would not need this extra drain between.

J. A. Fletcher, Fletcher, Kent: "This section of the country (Tilbury East Township) is on a fair road to improvement. Farmers are beginning to realize in hard cash that they cannot farm without drainage. I have enclosed a photo, taken on my farm (cutting wheat), which shows the advantage of thorough drainage. This farm of mine was practically a mud-pond seven years ago, when I bought it, and to-day I completed harvesting one 18-acre field of corn, which gave me the handsome return of over 3,000 bushels."

James Marshall, Hamilton, Wentworth: "In fifteen years I have put in over twenty miles of drains on my farm, and my only regret is that I have not used more of my spare time and attention to complete the underdraining and bring the whole farm into a better state of cultivation. In 1897 I drained a 12-acre field, at a cost of $460, almost $40 an acre, drains being 25 to 30 feet apart and 3 feet deep. The next year this field yielded 80 bushels of oats per acre; while the adjoining field of similar soil, but not drained, yielded only 45 bushels per acre, thus gaining 35 bushels of oats per acre by drainage."

If there is a man that ought to be able to talk drainage, it is the man that has put in 20 miles on one farm. Now, when Mr. Marshall sent me in that report oats were selling for 44c.; I believe they are 41c. to-day. That gives $15.40 per acre, and half a ton of straw would give $4; $19.40 in the first crop from that drainage. That is after the price of drainage, even where it costs $40 an acre. He goes on: "Another year I got the following results: 45 bushels wheat on drained; 25 bushels wheat on undrained, thus gaining 20 bushels."

Wheat to-day is $1.10, and there is $22 right from wheat, and add on half a ton of straw, and you have $26. I will give you another example from nearer home.

R. H. McCurdy, Vienna, Elgin: "Last fall I drained two acres that formerly would grow nothing. They were low spots in a field. Cost $17.50 per acre. This year I had 30 bushels of fall wheat per acre on them, while the higher land gave only 15 bushels. The drains more than paid for themselves with this one crop. The whole 30 bushels was gain, as those spots would grow nothing before."

Here was land that had never grown him anything before. He spent $17.50 an acre draining it, and gets 30 bushels of wheat to the acre. The good land of the field gave him only 15 bushels the next year. I suppose we will find him draining the high land as well as the low land.

I am going to show you some samples of oats, corn and wheat. In June of 1908 I went to Mr. McCurdy's farm and surveyed 50 acres for him, and gave him his grades. He is a man who has the courage of his convictions, and he went to work and put in about 2½ miles of drain. At the end of each survey we held a

public meeting and discussed drainage, and one of his neighbors applied to us to make a survey for him. Part of his farm was high and part low. Fifty acres of it was low, and he was never able to sow it until after seeding time. There is a stool of oats 2½ feet high, and here's a stool of oats from his high, loamy, good land taken the same time. He was able in 1909 to sow his flat land, that had always kept him back, three or four weeks earlier than he was able to sow his high land. These oats were both grown on sod. That which was drained was fall ploughed, and that which was undrained was ploughed in the spring, so that it was not a matter of difference in sowing or ploughing; it was simply a matter of difference in drainage. We could not handle the survey for his neighbour in 1908, but we turned it over to the district representative of that county, and he went back in June, 1909, to make a survey, and instead of having to make one survey for one of Mr. McCurdy's neighbors, he had to make nine surveys for his neighbors, who had been sitting on their fences waiting for their land to dry while Mr. McCurdy was sowing his low land.

PETER W. SCOTT, Belgrave, Huron: "The lowest field on my farm has drains 100 feet apart, and this spring it was the driest field and ready to cultivate the earliest. I consider in a year like this, thorough drainage doubles the value of the land for cultivation."

He sent samples of peas, one from undrained land and the other from drained. The biggest one was manured, and you see that the drained land gave about twice as high as the undrained. At the time this was taken, and the undrained was sown first, the crops of the drained land were twice as high the first week in July, and there were twice as many plants on the drained as on the undrained, and when it came to harvesting time he had 25 bushels of peas on the drained land and 15 bushels on the undrained.

The only difference between the manured and unmanured was that he got twice as much straw on the manured. These are facts from the field, and they are the very best testimonies we can have. The people who are talking drainage in the Province of Ontario to-day most enthusiastically are the people who have done most of it.

I know that this is pre-eminently a corn county. Mr. Duke and a few others of you will remember that a few months ago I wrote for information on the output of corn. On the difference between drained and undrained land I find it a little difficult to get the figures exactly. I have here a report from Mr. J. C. Thomas, of Blytheswood. He went to his field and took certain sections from his seed corn plot, and took the corn and weighed it, then weighed the stalks. Here is what Mr. Thomas reports:

MR. J. C. THOMAS, Blytheswood, Essex: "Part of my seed corn plot this year was on drained land and part on undrained. The results were as follows: Stalks, per acre, 4,000 lbs. on drained, and 2,320 lbs. on undrained. Shelled corn, per acre, 82 bushels on drained, 29.7 bushels on undrained. In my general corn crop I got the following results: Stalks, per acre, on drained, 2,970 lbs.; on undrained, 1,420 lbs. Shelled corn, per acre, 53.3 bushels on drained and 18.9 bushels on undrained."

There are 82 bushels of seed corn against 29¾, a gain of 52 bushels of corn per acre by drainage, and more than twice as many stalks on the drained than the undrained. You know what corn is selling for this year, about $18.70 for a ton, to say nothing of the stalks. Let me sum up these crop yields that I have given you. I have figured them up at market prices, and taking barley, oats, peas and fall wheat, and spring wheat, ordinary fall crops at market prices in September and October, the actual increase in output per acre was $19.60, for September and

October prices, and $19.62 at present prices, allowing an increase of half a ton of straw to the acre. This is the average of all the reports. Now, if we take with them hay and corn, we get a difference of $22.42 per acre, and these are pretty fair profits. You may say this is not all direct profit. There is more corn to handle and more wheat to bind, and more twine to buy. That is true enough, and it does take more to handle a large crop that a small one. On the other hand, it takes more labor to put your undrained land into condition, and I think the difference in the labour in the springtime will counterbalance the difference in harvesting the crop. So that I figure these profits represent an actual difference. What does it cost an acre to drain your land? That is a matter which varies according to the locality, and according to the price of tile and labor. Take the reports that have come in; the lowest is $18.00 and the highest $40.00, and strike an average of $25.00, and probably that is a pretty fair estimate. The lowest profit I find is $11.00 and the highest $36.00. So that you spend, say, $25.00 in draining your land, and you get back from it $11.00 to $36.00.

Have you got any other way in which you can invest your money and get it back in one or two years? I venture to say that you have not very many where you can put $25.00 on an acre of land and get it out again in one or two years. Some one will say, "I haven't got the $25.00; how can I invest it?" The Government has made provision for cases of that kind; and they say to you, "If you want to underdrain your land and you haven't got the money, we have got such faith in underdraining that we will advance you the price to drain the land. We will advance three-quarters of it and you can pay it back to us little by little in your taxes." The annual payment is $7.36 if you borrow one hundred dollars. You can go to your Township Council and borrow one hundred dollars. They get it from the Government at 4 per cent. interest; and you pay $7.36 a year for twenty years. One hundred dollars drains four acres; and the payment under that Act for draining an acre is $1.84. That is what it will cost you per acre per year to drain your land, and you get back from $11.00 to $36.00 as a result. Surely that is a pretty safe investment. You invest $1.84 a year and get $11.00 to $36.00 a year in return.

We have been making these surveys the Province over, and we are having twice as many applications as we can attend to. Last spring I saw that if we were to go ahead with the work, we must have more money. I wrote the tile manufacturers to find out how the tile output had increased since we started this work five years ago; and after I got in touch with the Clay Workers I wrote to the Bureau of Mines in Toronto, and found out that they had reports of the tile output, and got the figures since 1900. In 1900 the number of tile manufactured in Ontario was 19½ million; in 1901, 21½ million; in 1902, 17½ million; in 1903, 18 million; in 1904, 16 million (you see it is gradually going down); in 1905, 15 million; and I want to tell you that 1905 was the wettest year we have had in all these years, before or since. We began our campaign advocating drainage in 1905, and in 1906 the tile output rose to 17¾ million; in 1907 it dropped back to 17½ million; in 1908, 24¾ million, and in 1909, 29 million. It has almost doubled since we began our campaign in 1905. I want to go ahead with this work; we cannot stand still; we must have the courage of our convictions and go forward or else give up.

I took these figures to the President of the College and I said to him, "The people tell me that they have got twenty dollars an acre more from the land they drained; and the Bureau of Mines say that the tile output has doubled since we began work. Now then, if we figure out the amount that has been drained since 1905, it means fifty-three thousand acres; fifty-three thousand acres at twenty dollars an

acre means one million and sixty thousand dollars; and that means that the farmers of Ontario have increased their annual output by one million dollars a year."

"Now," I said, "here is this list of applicants, and what are we going to do?" He said, "You have the argument, and it is up to us to give you the money," and I am glad to tell you that we are going to have four times as much this year for carrying on this drainage campaign. We have had three men making surveys in the past, and we expect to have nine men this year. We expect to be able to divide our men up, assigning a man to the counties of Essex, Kent, Elgin or Lambton, and another man to certain other counties, and the work will be directed from the College, so that we expect to have four times as much money for this work. We expect to carry on about four times as great an educational campaign, and I have faith enough to believe that we will double the tile output again in two years. I would say to you tile men that if we supply the demand for the tile it is up to the tile men to supply the tile. Quite a number of these men who sent in reports said: "We cannot supply half the orders this year." One man said: "I could have sold four times as many tile as I did." Others said they could have sold twice as many, and that is why I say that we have not tile enough. It may be that some yards have a surplus.

You can get on your land early in the spring and till it with less cost when you have it underdrained. Twenty-six of our correspondents reported a difference in the time of seeding; and, would you believe it, two-thirds of them were able to get on their land two weeks or more earlier than they were before. Fifty per cent. of them were able to get on their land four weeks or more earlier than before it was drained. Thirty-one per cent. of them were able to gain five weeks in time of seeding. Twenty-three per cent. gained six weeks or over, and fifteen per cent. of them gained the whole season, which means that they were able to sow on land that they never could sow on before. Perhaps it would be better to say they gained a whole lot of seasons.

Then again, it is not so hard on machinery. I remember running a binder over undrained land with the old water furrow in it, and every time it went in it would make me cringe. That doesn't occur on drained land. You do not need these water furrows, and your machinery will last longer on the drained land, because it is softer and more yielding. Just as a horse will last longer on clay roads that are yielding than he will on hard city streets, your machinery will last longer on drained land.

I want to say a few words about the soil conditions that bring about these great results. The first, and perhaps the most important, soil condition produced by drainage is that the soil is made more open, more porous. I wonder if you people have as much land as you think you have. Take a foot of your soil and take all the air out of it and I wonder how much actual soil there would be left. How much of your soil is air? You would probably be surprised to know that from one-third to one-half is air. That is on drained land. On undrained land it is probably not more than one-quarter air space. The undrained land gets saturated with water and it lies together, it puddles just like putty; but the drains never allow that access of water to accumulate, and therefore the soil never gets a chance to run together on the drained land, and consequently you always have a porous, open soil, which is very important, because the more room you have for the air in the soil the better; because the air is just as essential to the roots of the plants as it is to the tops or, indeed, as it is to human beings. The roots cannot live where there is no air, and that is the first great benefit in the improvement of the soil conditions, that there is more air space and consequently better ventilation.

Now, the next point is that there is more water in the drained soil when it is ready to work than in the undrained when it is ready to work. That is strange. You are draining land to get rid of the water, and yet there is more water in it and it is not wet. You have all had this experience. You have taken a piece of putty that you thought was pretty dry and thought you would have to put more oil in it, but you began to work it, and by and by it worked up pretty fairly and you could work oil out of it. You have also taken mortar that looked pretty dry and after you worked it with a hoe you could see the water standing out on top. It is in that close, compact condition, the same as the mortar, but the drained soil has an open condition, and you can have just as much water in it and yet it will not be wet.

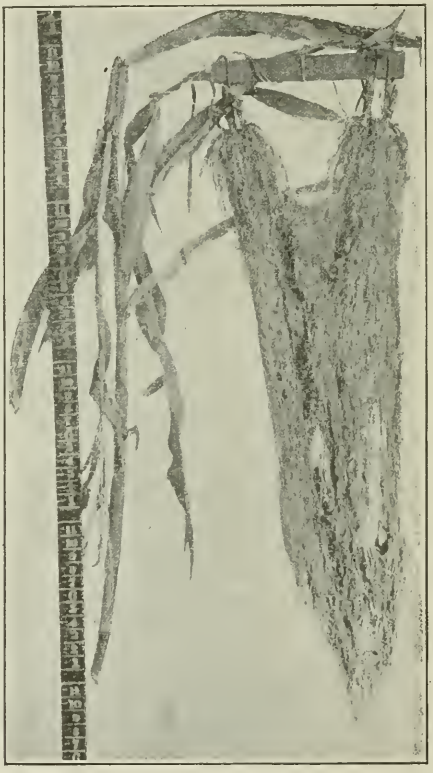
Q.—How would you account for the fact that a heavy dew will start drains running?

A.—That is something that has never been solved. I had my breakfast at the hotel this morning, and they brought me a piece of dry toast on a plate, and when I took the piece of toast off the plate it was covered with moisture. Where did that moisture come from? There was a piece of toast that was hot and dry; it had been dried out on the fire, and yet there was moisture on that plate. Now, then, the plate was cold. You have all seen this. Light a lamp and you will see moisture collect on the inside of the lamp chimney. Where did the moisture come from? In this case you have two conditions: You have the source of moisture, the flame supplying the moisture to the lamp chimney and the toast supplying the moisture to the plate. There was moisture in that toast that was hot. It was vapor, steam, if you like. There was the cold plate, and as the moisture came in contact with the cold plate, that cold plate turned it into water. It was steam before. And there was the plate drawing the moisture out of the hot toast. In the daytime your soil gets warm, and it is full of moisture in vapor, and it is also full of moisture as water. When the night comes on and the surface of the soil cools very rapidly, and the same process that went on in that plate goes on in the soil. Here is the top of the soil cold, and down below there is the warm soil supplying the vapor, and that comes up and condenses as water, right in that top soil, just the same as the water condensed on that plate from the toast, and that is the reason why the dew starts your drains running. It brings up water from below. It is not the dew that starts the tile running; there is not dew enough deposited to start them running; but it is this internal condensing of that moisture coming up from below to such an extent that the drains have actually started to run. The amount of moisture that is brought from below and condensed in the soil, we do not know; but the point is this, that it goes on, and that is one reason why the dew seems to make such a wonderful difference to our crops. It is not the dew at all; it is the cold surface layer, the bringing up of moisture from below and condensing it in the upper layers where it is within reach of the roots.

Drained soil has more water in it in July and August than an undrained soil. The drained soil has always the most moisture in summer. An old gentleman said to me at the Winter Fair that drained soil is never wet and never dry, and that is the important part of it, that it is never dry. The drain saves the moisture for your crops. It is not the excessive water in your soil that does the injury, so much as lack of air.

This drained soil brings up more water during the season by the process of capillarity. You have seen the lamp-wick dipped in the oil and gradually bringing it up to the flame. As long as there is nothing to use the oil, there is no oil coming up, but you start the flame to use up the oil, and it gradually brings up the oil and

uses it. That force, that brings up the oil through the pores of the wick, is called the process of capillarity, and so the soil is just like the lamp-wick. Here is a drain right at the surface of the soil using up the water, and there is a great supply of water in the soil below, and the soil, like the lamp-wick, brings up the water to feed the flame of life in the plants, and all summer long your drained land keeps on bringing up that surplus of water by the process of capillarity. There is more root space in a drained soil. You who have our bulletin on drainage will find a couple of pictures, one with the roots going straight down and another with the roots spread out. Those of you who are familiar with



Showing the total roots of one hill of corn. Note one of the stalks, doubled beside the measuring stick.

pine know that the one grew on high land, where the drainage was good, and the other grew on flat land, and you know from that that the stand was thicker on the high land where the roots can go down, because they don't need to spread so much. Your crop roots need more room than you are accustomed to think. You will find some pictures which show the crop roots on clover and corn going down three and a half feet and four feet deep. You sow your grain in drills eight inches wide. The roots start to grow, they go down a little and come to some water six inches down, and they won't go down any farther. They start to go out sideways, and only go four inches till they meet some other roots coming the other way, so you can see that if the roots cannot go down there is not much room for them to go anywhere until they are met by roots from the next row, and just as surely as they cannot go

down they are going to become crowded, and just so surely as the roots become crowded there will be small root development, and just so surely as there is small root development there will be a small plant above ground, there will be a small crop, a small yield, and a small amount of grain in the granary. The root controls the whole situation. Isn't it a fact that the first plants to suffer from drought are the ones on the undrained land, because the roots are small and they have got a long way to bring up any water, and therefore they suffer right away.

Right here is probably the best time to say something on the method of draining. If your oats have roots 2½ feet deep, and if your barley has roots 2½ feet deep, and those of corn are 3½ feet deep, is it not necessary that the drains should be a fairly good depth in order to get the best results from your farming? You must have such a soil condition that the crops will develop the richest root system they are capable of, and your drainage must be such as to allow the greatest root development the plants are capable of, and therefore, as a result of that argument, we believe the tile should be three feet deep. Mr. James Marshall, who put in twenty miles on his farm, says three feet deep, even in this heavy clay, is not too deep, and he says he would rather have them four or five feet if it were not for the expense of putting them down. Some of you have come from the Old Country, from Scotland and England, and I want to tell you that only last summer about twenty-five or thirty of the journalists of the Old Country were over in Canada, and I had the privilege of talking to them for a few minutes, and in the course of my remarks one of them, who was a farmer as well as a journalist, asked what my opinion was as to the depth of drains. I said "Three feet"; and he said, "Over in the Old Country, as the result of long years of experience, we have at last come to the same conclusion, and over there we are putting our drains three feet deep, and experience has taught us to do it."

The drained soil is warmer in spring than the undrained, about five or twelve degrees. Why is it warmer? For several reasons. In the first place, the drained soil is dry earlier than the undrained. A while ago I told you that a drained soil, when it was ready to work, had more water than an undrained soil when it was ready to work. But there is a long time when the undrained soil is not ready to work, and during that time the undrained has more water in it than the drained; and water is the hardest substance in creation to heat, and the more water you have in the soil the harder it is to heat. Therefore, your undrained soil, which is too wet and has too much water in it, will be slow in heating. You set a pail of water outside, and by and by you come along and find it is only half full. Where has it gone? It has dried up. It has gone off in vapor. Do you know what the boiling point of water is? Maybe you have been scalding pigs, and the water has got up to boiling point, and you cannot make it any hotter. You cannot make water hotter than the boiling point; you cannot heat water up more than 212 degrees at atmospheric pressure. You have all seen your wife set the kettle on the stove, and it has started to boil. If you put the thermometer in you would find it getting hotter and hotter, and by and by it starts to boil, and you cannot make it any hotter, although still there is heat going into that water; the fire is still sending heat into the kettle, but it is not getting any hotter. When it starts to boil it is turning the water into steam, and it takes five and a half times as much heat to turn it into steam without making it a bit hotter as it does to heat it from freezing point up to boiling point. What has that got to do with this pail of water sitting out there? Whether that water is turned into steam by boiling, or turned into steam just by drying up, it takes that same five and a half. Therefore, as long as the water is evaporating from the soil, heat is being used up in turning the water into vapor.

Now, then, here is the sun pouring down heat on your soil during the month of May, and your soil evaporating. What part of the sun's heat will evaporation use up? It is just like the fire sending heat into the kettle; how much of that heat is wasted? All the heat that went into the kettle after it started to boil was wasted. You do not get any result, and all the heat that comes down from the sun and turns the water into vapor, and does not heat the soil, is wasted. How much of the sun's heat is being wasted while evaporation is going on? Will anyone venture a guess on that? You will be surprised in the month of May, while evaporation is going on, to know that just about half of the sun's heat for the whole day is used for turning that water into vapor, and it is a very considerable loss of the sun's heat. But if you take your soil and drain it, it looks dry in a day or two after the rain, and you save a lot of the sun's heat just as soon as your drained soil stops evaporation. Therefore, the soil is warmer by five to twelve degrees; and that is important, because corn will not germinate until you get between 80 and 90 degrees of heat in the soil. Here is the undrained soil keeping it 10 to 12 degrees too cold. A poor start is fatal to the plant. It is often said that a good start is half the battle, and it was never truer than in the case of the seed which you sow and the plant which begins to grow from it. A good start is half the battle of life to that plant. If you stunt it in the earlier stages it is stunted through life, just the same as if you stunt a pig in his earlier stages, you can never feed that pig and get the profit out of it that you should.

There is another result from the increase in the temperature of the soil. I need not tell you farmers to-day that there are germs, bacteria, in the soil, little organisms that you cannot see with the naked eye; you have to have a microscope that multiplies thousands of times to see these little germs, but they are one of the important things in farm life. A plant cannot use sand, a plant cannot use clay, and a plant cannot use manure as such; that clay and that sand and that manure has to be turned into a soluble salt. It has to be turned into a condition that it will dissolve in water, so that it can go into the plant. These bacteria are the very things that take the soil and manure, combine them with the elements of the air and make them into a soluble salt, which then dissolves and goes into the plant to support it. These bacteria cannot live without air any more than you can. There are some bacteria that can live without air, but these that you want in your soil cannot live without it. They also require the proper temperature. As soon as they get uncomfortable they do not work well, any more than you do. If you were too cold, maybe you would work harder and get warmed up, but it does not seem to work that way with bacteria; they have not got sense enough to know that.

They find plenty of air, and they find plenty of warmth, and so they thrive to the best advantage. Unite the elements of the air with those of the soil and you provide abundance of food. The bacteria are to the plant what the cook is to the family; you may have plenty of food in your pantry, but if it is not in an eatable condition it is useless. And there may be plenty of plant food in the soil, but unless it is brought into an available condition it is useless. The bacteria bring it into available condition, and they work best in a drained soil. Therefore, it follows that the drained soil has more valuable plant food in it than the undrained; and, furthermore, the drained soil is three feet deep and an undrained soil only about one. The greater root system enables the plant to take advantage of this greater amount of plant food. Some of these bacteria are so constituted that if they cannot get the oxygen they want, from the air, they will turn round and destroy the plant food that is available.

If underdrainage will place the seeding time ahead and lessen the labor of tillage by half; if it will increase the output by twenty bushels of barley and twenty bushels of wheat; if it will double the yield; and if it will make fruit trees grow where otherwise they would not grow; if it will increase the profits from every acre by twenty dollars; if it will do these things, all of which our correspondents say it has done for them, then isn't it high time that underdrainage should become a general practice throughout all the wet parts of this Province. If you don't get the soil right you will not get good results. And in many parts of the Province—Essex and Kent and Lambton in particular—underdrainage is one of the essential features of bringing the soil into that satisfactory condition.

TILE DRAINING MACHINERY.

By W. D. McCaughey, Findlay, Ohio.

I am a farmer by profession, more than half of my life having been spent upon the farm. I have cut many rods of tile drain with a spade, and I think I know something of the subject upon which I am to talk.

I went into the tile draining machinery business because I believed that it supplied a long-felt want, and something that was just as necessary as other machinery that is used in agricultural work. The old-fashioned ways of doing things are past and gone. The typewriter has taken the place of the pen. The adding machine has taken its place behind the desk and the counter, and when you come to farm work the same thing has taken place. The reaper and the mower have taken the places of the sickle and the scythe, and the threshing machine has taken the place of the flail.

Almost every farmer knows that it is impossible to hire help to do farm work. The farmer realizes that he must in some way increase the productiveness of his farm, and the first thing he should do is drain his land. Many farmers say they will buy fertilizers, and they are all right. I do not want to say a word against fertilizers, but I will tell you that if you will drain your lands, and then use fertilizers, it will give you double the results.

Drained land will stand more drought than undrained land. These things being admitted, how shall we drain our land? Plans of drains have been presented to me by Prof. Day, in my capacity as head of the Buckeye Ditching Company, and I can say, with no hesitation, that none of the plans from other countries, such as Denmark, France and Italy, that I have seen surpassed those of your own Agricultural College at Guelph. One trouble I found with some plans was that they did not make their tile large enough. It does not cost a bit more to dig a ditch to put in a four-inch tile than it does to dig a ditch to put in half-inch tile. All the difference is in the price of the tile. The great trouble we have in this country is that the farmers are too economical, too close, and when they run their drains they take them through the low land, circling around along the water course and off the ridge. We say our lower land is the strongest. Why? Because the silt from the ridges and the upper ground gradually rolls down into that lower land, enriching it at the expense of the upper ground.

When you lay your drains do not put them around the low ground, but have a general outlet, and then lay your drains parallel to it, going right through the ridges.

I have drained many clay ridges, and these require tiling just as much as the

black soil does, and you will get just as good results from draining clay soil as you will from draining black soil.

I put a ditch through my own land, and I went through ground that was so hard that it could only be dug with a pick. The first year I put it in corn, and it was about six feet high. I was surprised when I found such good corn. Then I put it in wheat, and the best wheat was right on the ridge where the tile drain went through. As the years went by, the drain gradually drew the water to it until that drain drained about two rods each side You cannot lay down any set rule for drainage. It must be in proportion to the porosity of the soil.

No man can cut an absolutely true to grade ditch with a spade. If the soil is exceedingly soft, when you put your foot on the spade you cannot cut exactly to grade. If you let a job of cutting tile drain, and decide to go through ground that is extremely hard, you will find that the tendency of the men cutting it for thirty cents a foot is to not dig deep enough when they come to these hard places. And if you are doing the work yourself, you are a little inclined to do the same thing. But when you do the work by machinery, the machine does not care whether it cuts three feet, or forty-two inches, or twenty inches; it simply rests with your brain as to what depth you are going to have the drain, and the machine will do the work and get it absolutely true. One advantage of a ditching machine is that it gives an absolute grade.

With one of these machines a grade as low as one inch in 500 feet can be cut exactly. You cannot do that by hand. You can lay every tile as you go along, and every tile will work ten years from the time it is put in, because it rests on a solid foundation.

The question may be asked, how do we hold that grade so true? We have a shoe at the rear of the machine, and the weight of the wheel rests upon this shoe. The shoe is made with a half-round piece of steel on the bottom, that makes a curve for the tile to lie in. The weight that is on it is about 3,000 lbs., and if there is any rise or fall this shoe is set so that the bottom of the drain is cut as level as this floor, and every tile lays right against another. The grade is one of the important things in connection with tile drains. Another point is that the machine does not go on strike, and I will guarantee that if you do your part the machine will do its part. We make the machines, and you must put the brains on the platform, and then you will have a perfect ditching apparatus. If you put a man to dig a ditch with a spade, he cannot do it nearly so well as we can with the machine.

Now comes in the question of the cost to the farmer. Do not calculate that you are going to get this work done for nothing, and do not think that the man who owns the machine is running it for his health. The laborer is always worthy of his hire if he does an honest job, and he should have a profit upon it. Do not consider that by using tile a little smaller that you are going to make money. It is a better investment to put in a good size, and it will pay you well to do it right. If you are plowing a field, do it right; if you are raising wheat, put your ground in order and do the work right; and when you buy your tile, if you are absolutely certain that 2½ inch tile will do the work, put in three inch. That is the way to do work on your farm. Run your tile parallel: do not try to follow the lines through the lowest part. Tile the land which is highest as well as that which is lowest. Open it up so that the soil can take in plenty of air to feed the roots of your crops, because by doing that you will get a better crop. The machine is calculated to do this work better than you can have it done by hand. Another great advantage of a ditching machine is that with it ditches can be dug from eight to ten months of the year. By hand you either have to ditch in the spring or in the fall.

The best time for ditching with a ditching machine is when the ground is dry. Have the lines for the tile laid out, with the fall that they are to have, consider the depth, and then the amount of fall you are able to give. The machine is calculated to work three feet deep in ordinary soil; that means clay soil. It will cut at the rate of about three feet a minute while in operation, and if you figure for a few minutes you will find that if you want to cut 100 rods a day, three feet deep, how many men you will need. The larger the machine the more men it will displace.

We are now using the gasoline machine, and have the web wheel in place of the regular wheel, so that you are travelling over safe ground. That wheel is made interchangeable with the common wheel.

Q.—How does the machine work in stony land?

A.—If it is extremely stony I would not advise buying a machine, neither would I advise you to buy one if you have a great deal of quicksand. If you have small stones the size of your fist, or a little larger, it will do good work, and if the stone is as large as your head and comes exactly in the centre of the ditch it will take it out; but an extremely large one it will not take out, and if it would, when it came round to the top it might drop on the belt and break it; therefore, I would advise taking the stones out by hand.

Q.—What is the price of the machine?

A.—Without steam, $1,200; 4 per cent. off for cash.

Q.—How will it work in stumps or roots?

A.—You cannot go through a stump, but it will cut a root off and go ahead.

Q.—Is the $1,200 machine the only one you have?

A.—No. I would advise buying a 15-inch machine, because it will lay all sizes of tile, from a foot down. We make three sizes for farm work, a machine which lays tile from three inches up, and another which lays tile from one inch up.

Q.—Does unevenness of the land make any difference?

A.—No, not unless it is beyond the depth of the machine. Suppose we come to a ridge and start at a depth of 2½ feet. The ridge is five feet in height. The machine is calculated to cut only 4½ feet, and it would leave six inches there that could not be cut. Now the machine will cut actually four feet nine inches, and if you take a plow and throw out a furrow, then it will be easy to cut the five feet.

Q.—Do you cut the same width for four-inch tile as for eight-inch or ten-inch tile?

A.—We make two sets of buckets for a fifteen-inch machine.

Q.—Will that machine make an open drain?

A.—No, the open drain machine is a different machine. I do not think in this section that you are justified in using it. It is made for the requirements of swamp lands, and we do a large business with this machine. If you had a great number of open drains to cut you might be justified in purchasing one, but I would not advise it. The time will come when you will be doing just exactly what they are doing in Iowa. You will be laying twenty-four-inch tiles in these open ditches, covering them up and farming all the land.

Q.—How much will the machine cut in a day?

A.—The capacity of the machine is calculated to be a hundred rods a day in ordinary ground, but if there are a great many stones or roots it will not do it. I have asked that question of several men who have run the machine for years, and they tell me that when they take the time off for running and moving they calculate the average for the season is from 80 to 90 rods a day.

Q.—Has the company any device for placing tile?

A.—We have not, but you can make a device of your own; you can adjust to that shoe another shoe curved the other way, and then you can lay the tile right in there.

Q.—I suppose it takes an expert to run the machine?

A.—The man who runs the machine does not need to be an expert machinist. He needs to be a man with brains, who will take care of the machine. We make the machine, but we want you to furnish the brains on the platform. We have what we call a cross-arm; that is, we have a pointed piece of wood that we drive into the ground, and then there is a piece that lays across that and then they are brought to a perfect grade, so that as we go along all we have to do is to keep the cross-arm in a direct line and machine is bound to go straight.

Q.—What is the average expense of running this machine in good clay, making a ditch three feet deep?

A.—A man that owned a machine said that it cost too much to keep it up, and I replied by saying that it was strange that he bought the second machine. I called to the bookkeeper, and asked him to bring that gentleman's account for repairs, and we found the amount of money he expended was about ten cents a day. If you are working in very hard ground that is full of hard stones, and the side-cutter strikes these stones, something has to go. We do not calculate that the sprocket-wheel will break. The weakest point is calculated to be the part that holds the side-cutter, and the next weakest point is the chain. The cost of the operation of the machine is about a ton of coal in three days for the small machine, and the larger machine used a half-ton a day, or from 800 to 1,000 lbs. a day—that is, about $2 a day. The oil will cost you in the neighbourhood of five cents to ten cents a day, and the repairs will probably come to about ten cents, making the total cost of running the machine $2.50 a day, including repairs.

Q.—What would it be for gasoline?

A.—Cut the above cost in the middle and divide it by two, and you will come close to it.

Q.—How many men are required to operate the machine?

A.—Two men to run the steam machine, and one man and part of a man to run the gasoline machine; but it does not take all his time, and he can spend his extra time laying tile in the ditch.

ADDRESS.

G. H. Clark, Seed Commissioner, Ottawa.

My namesake on Parliament Hill, the member for Essex at Ottawa, has been saying a great many things to me lately about the great things I could see at this Corn Show. He painted it up in quite high colors, and that perhaps had something to do in directing my business near here, and it only took another day to come to this Corn Show. I will always have a little more respect for Mr. Clarke, but he did not paint the Corn Show as high as I would have, and as I will when I go back to Ottawa. It is really excellent.

Part of my interest in coming here was not so much as to what I would see in the interest of the farmers of South-Western Ontario as it was for the benefit of Eastern Ontario and the Province of Quebec and the Provinces by the Sea. We

think we are even farther advanced in dairy farming than the farmers of Western Ontario. The dairy farmers of Eastern Ontario have become very largely dependent on ensilage corn.

Just take three of the largest dairy counties in Eastern Ontario, and they produce more than thirty-five thousand acres of corn. They do not raise corn for seed; they have to get their corn from the states to the south, and large quantities of it come from the State of Nebraska.

Mr. Grisdale and some others and myself at the Department of Agriculture at Ottawa have shown them, as far as we have been able, and I believe that we have succeeded in convincing them, that the corn they have been growing for ensilage was not sufficiently early to give the best results for ensilage, and we have been directing their attention towards getting their supply of seed corn from South-western Ontario.

I do not know what I will be able to say to them this year. To stand back and look at that corn, it is beautiful, it looks very fine, but I was permitted to go in and handle some of it, and I regret to say that there are some samples a little dangerous to use for seed, and if you want to get some of that trade of 35,000 acres in three counties alone (because it will be a profitable trade), if you want some of that, you must not endanger the ensilage crop of a single farmer in Eastern Ontario, not in one year. They must have the very best quality of seed corn five years out of five years.

A few obtained seed corn from Essex and have had a failure thus far. One failure, even in seven years, would mean that they would never come back, and we want them to get it from here for their own benefit, and we want them to have larger supplies from South-western Ontario for your own benefit. You must see to it individually and collectively that the seed corn that comes from here for these ensilage crops for the large farms in Eastern Ontario will be number one quality, and number one quality only.

It is up to the Ontario Corn Growers' Association to see what can be done to improve the crop. Professor Zavitz mentioned something about the Seed Control Act, and it is my duty to administer that Act in connection with the Federal Service. That Act does two things, and I want to mention one thing that the farmers have been humbugged with: In the first place, it fixes a standard below which it considers grass and clover seed to be screenings, a standard of five to a thousand; it considers anything below that screenings, or next to screenings; below that you must not sell for seed. Some men who call themselves seed merchants have labelled their seeds "Government Standard," knowing they would pass that standard. But the Act does another thing; it fixed the standard for number one quality, for timothy, alsike, red clover and alfalfa, and number one quality is a quality that no farmer here will complain about, and if you are willing to pay half a cent or one cent more for good clover seed and good alsike seed, see to it that your dealer supplies you with seed marked "number one," not as they represent, but seed that is marked number one. You have the privilege to send any of that seed, free of charge, to Ottawa, and if it does not come up to that standard we will see to it very promptly. We do not want the farmers to be humbugged with "Government Standard," below which everything else is screenings.

The amendment this year is doing something else. We know from investigation that there is a great deal of seed grain that is put on the market with very low vitality, especially garden seed and vegetable seed. We have said to seed merchants: "Good mangel seed should germinate 90 per cent.. and if you put mangel

seed on the market below 60 per cent. we will prosecute you." In other words, we fix the standard of vitality for good seeds of various kinds of the different crops.

From what I have seen of the farms of Essex County, if you went to Germany, Denmark or Sweden, and continued with the wasteful practices that are everywhere evident, even in the winter season, you will find it exceedingly difficult to earn a living for yourself and your family, and you would be crowded to the wall.

In Sweden the average size of the farm is twenty-five acres, many of them less, and the average size family on a twenty-five acre farm is seven. They have a little more than three hundred and fifty thousand of these twenty-five acre farms. Among these three hundred and fifty thousand farms they have at the present time forty-six agricultural schools.

If we had Schools of Agriculture distributed over the Province of Ontario that would give a service like these forty-six schools, we would have at least one in every county.

ADDRESS.

HON. J. S. DUFF, MINISTER OF AGRICULTURE, TORONTO.

I am pleased indeed to have the great privilege of addressing you for a few minutes to-night, but perhaps not so much for that privilege as to have been privileged this afternoon to see the splendid exhibition you have here under the auspices of the Ontario Corn Growers' Association.

Moving as I do and taking every opportunity which is afforded me of coming in contact with the people of this great Province, of this premier Province of our Dominion, I am wonderfully struck with the fact that beyond the knowledge of most of us, we have a variety of claims, and all that goes to make up a diversity of agriculture to an extent that is not known in any other province in the Dominion of Canada.

When I go into sections of the Province where I have never been before, what is uppermost in my mind is the fact that we, of this great Province know very little of the local conditions of the various parts of the Province. If I were to stand before such an audience as this in the Eastern part of the Province and tell them of the great Corn Show here in the County of Essex and the type of corn cultivated here, of its success and possibilities, they would scarcely believe me, because it does not dawn on the people who are living in the more northerly portions of this Province, that you are practically in a semi-tropical climate down here in Essex and Kent.

If there is one thing that I ought to do, if there is one thing that I ought to bring before the people of this Province, it is to endeavor to instil into the minds of those people, a greater appreciation of our Province as a whole, by becoming acquainted with the local conditions of the various parts of the Province. That can be done to a certain extent, not by personal visits, but by careful perusing of what comes to their hands in connection with agriculture. There is no doubt that the newspapers will tell the Province to-morrow of this Corn Show, and how many of our people who take the daily newspapers will give a thought to it? They never think of reading it. But if we could instil into the minds of the people, that if we are to do the best that is in us, we should find out the locality that is best suited for particular things, and then apply our energies in that direction, then we will be doing much greater work than we can without that knowledge.

It has occurred to me that the people of the County of Essex need not care very much whether they grow wheat or not. It matters very little to the people of this splendid county, or the adjoining county of Kent, whether they grow wheat, when they can grow tobacco and get good prices for it, and when they can grow corn and get good prices for it, and when they can grow fruit as you can in these counties; and if you will specialize in these you will be doing more as a community for the country than you can in any other way.

What I have said with reference to the people of the County of Essex is applicable in other lines of agriculture, to Grey, to Bruce, and to Simcoe, and many other counties that I might name in Western Ontario.

Mr. Clark, Seed Commissioner at Ottawa, called your attention to the enormous quantity of corn that is grown in Eastern Ontario for ensilage purposes, because it is a dairy section. We do not understand the great strides that have been made in dairying in Eastern Ontario. They have about twelve hundred cheese and butter factories in the East and only about three hundred in the West.

I was delighted at the manner in which Mr. Clark spoke to the people here in reference to seed corn. You must come up to the standard, and you must provide seed corn that will not be a failure in order that you may hold the market. One of the troubles we find to-day is the fact that the very moment that the farmer has his hand on a market at remunerative prices, that very moment the quality goes back. Those of you who read the papers will have noticed this very year, how many of the gentlemen engaged in the apple business in this Province have been before the "Beak" because of the violation of the Fruit Marks Act.

If every barrel of apples put up in the Province of Ontario for export to the British market were as represented, I venture to say it would mean many thousands of dollars to the people of this Province.

I think perhaps the greatest good that will come from this splendid Association that you have in this part of the Province will be the impetus that will be given to those that are engaged in growing seed corn, to grow the best possible quality, so that in the future, and I trust it will be only a little while, the people of this Province who require corn for seed for ensilage purposes, will be buying it here instead of on the other side—buying it in these splendid counties where you can easily grow far more corn than would be required for the ordinary seed corn business in the Province of Ontario.

Each part of the Province seems to be very happily situated with reference to its own special lines of work. We have our fruit belts and our dairy belts, and sections where there is nothing more remunerative than the growing of wheat.

Last fall I was at an agricultural show in the town of Goderich, where they had an apple display. I was talking about the apple districts of the country, and found that we have several belts in this Province that are suitable for growing apples. We have some tracts that are especially adapted for growing early fruit, and other tracts adapted for winter fruit. If you go into Northumberland and Durham, you will find one of the finest fruit belts, so far as apples are concerned, that can be found. Even along the shores of Georgian Bay, where I came from, are grown the best quality of peaches that have been grown in the Province of Ontario. They are grown right in the town of Collingwood, and also on the shores of Georgian Bay. At the same time that is not a district where peaches can be cultivated with the idea of making money out of them. Then, as you come down the shores of Lake Huron you are in the apple district; when you get to Lambton you are in a first-class peach district, and from there to Niagara Penin-

sula we have a great section of the Province that could be developed along fruit lines to the extent that no person can possibly dream of.

This last season over 500 cars of tender fruit were shipped from St. Catharines into the Canadian North-west. The other night at the wind-up of the Ontario Fruit Growers' Association, they had a little banquet. Before that time only a few cars of fruit were shipped to the North-west, but this year with the greatest fruit crop we have ever had in the Niagara Peninsula, with ordinary conditions, the market would have been kept flooded. Notwithstanding that great crop, it took them all their time to cope with the requirements of the people, and those who lived in the section of the Province where they did not grow peaches, notwithstanding the splendid crop, did not get many baskets of peaches for a small price; they were all sold at good prices. The railway people were at that meeting, to say to the farmers, "Improve your farms, underdrain your land, and increase your output! The more you do for yourselves the better it will be for us." They showed their sympathy with the farmer, not merely for the love of the farmer, but for the love of the business they will get from the farmer.

We have some other interests in the Province of Ontario in the northern regions. We have a great mining interest, which is to-day the talk of the world. In Cobalt we have not only the greatest silver mines in the world but also the most orderly mining camp in the world.

I would not like to retire from this platform without saying a word or two in reference to the work in which Mr. McKenney is engaged. I was delighted to hear the kindly words spoken by you about him, and I was very pleased to hear the response made by the audience. You will remember what was said by Mr. Clark with reference to the Agricultural Schools in Sweden. Some years ago there was a great deal of talk in this Province, there was some effort made to diffuse agricultural knowledge throughout the Province. True, we have a College at Guelph, an institution that is growing year by year, and which perhaps was never more popular than it is to-day. But after all there are only a few boys, comparatively speaking, who can avail themselves of the opportunity of attending that College. In any case the room is limited. What does it mean? It means a very large expenditure by the people of the Province for the up-keep of this College, and it only has a direct benefit to a comparative few, and the Government felt that by other means they might try the experiment of placing men from the Agricultural College in centres here and there throughout the Province, thus bringing home to the people as far as possible knowledge and enthusiasm in the line of agricultural work. Then representatives were appointed. Mr. McKenny was one of the first placed in charge of a section of the Province as District Representative. At that time there were also a few others appointed.

Last year we had eleven men doing similar work, and it is the earnest endeavor of the Government, as far as our revenue will allow, to move in the direction of sending graduates of that College here and there, attaching them to localities, to move in and out among the people and get them to become enthusiastic in the work in which they are engaged.

I was delighted when you delivered that address of "Welcome" to hear the tribute you paid to the agricultural people of this Province, and if there ever was a time when the farmers could hold up their heads and say, "We are the people," it is now. We are only coming to what is our own. We have always been the people of this Province. The only trouble was that we had not pluck enough to say so. We were acting on the assumption that because one boy goes out of the

home and becomes a preacher, and another one a lawyer, we had an idea that these fellows were better than the chap who stayed at home on the farm, and it never dawned on him that he was as good as they were. If you want proof of what I say, look in the newspapers. For the last two weeks there is scarcely a paper that you can pick up but that has a big head-line on the high cost of living. And why is it that living is so high? It is as plain as the nose on a man's face. People are leaving the land and going to the towns and cities. The population of the towns and cities, not only in Canada and the United States, but all the world over, is increasing very much more rapidly than the producer on the soil, and consequently there are more people to feed and less people to produce the food which they require.

There are causes leading up to this. Many young men leave the farm because they do not receive that encouragement from their fathers and mothers that would have instilled into them a love of agriculture. I know the farm. I do not know the life of other people, but I have watched the careers of many of the boys whom I knew long ago, and many of them are lawyers and doctors and parsons; but take them all around, the average boys who stayed with the land are better off to-day than the fellows who left it.

Has it ever occurred to the average farmer that there is no class of people in Canada who have the wealth that the farmers have? What do the statistics tell us? They tell us that about 90 per cent. of the boys who go into business make failures, but it cannot be said that 90 per cent. of the farmers are failures. Go up and down the concession lines of any county in this Province, and you will see the people's homes and beautiful bank barns and nice orchards and the beautiful lawns; everything showing industry, thrift and intelligence.

If we lack anything as agriculturists it is perhaps because we are sometimes imbued with the idea that we have to work too hard. I do not think it is a very bad fault. In the neighborhood in which I live, I have seen in the long summer evenings, when an hour in the evening is worth a great deal to the farmer, and more especially to the young farmer, that after the six o'clock supper is over and the chores done and everything is nice and quiet the boys hitch up the rubber-tired buggy and away they hike to town. This is all right in its place, but I tell you frankly the business man who makes a success of his business does so by sticking closely to it. Take the store-keeper in this town or any other town, or lawyer or doctor or professional man, and you will find that the men who make a success in any line of life are men who make good use of every hour they have out of the twenty-four. Take the store-keeper in the country. He is there by eight in the morning, and standing there until ten at night, and Saturday night until twelve, watching for the customer, trying to be nice and affable. We should apply the same principle to our work, because in the winter time the farmer need not work very hard. The days are past when the lantern was swinging around the barn at ten or eleven at night. But in the long summer days, when the snow has gone, and as we say in our northern country, until the snow begins to fly in the fall, the farmer who is making a success of his business is busy. The farmer who has money in the bank and who can afford rubber-tired buggies is working every day and taking every opportunity, not losing a minute that he can possibly help.

In closing I want to point out this fact, and you can depend upon it, that as far as the Government of Sir James Whitney is concerned, there is nothing that they have given their energies to more than education and agriculture. We have eleven district representatives in this Province, doing similar work to Mr. McKenney,

only on different lines according to the different localities in which they are placed. I think the people, irrespective of politics, all over this Province, are pleased, and as our revenues allow us, we are determined to follow that work up and help the people out in every way possible.

After all, the Ontario Legislature is only an administrative body, and if we with the funds available, do all we can for the people, then I am sure we will have due praise from those whom we serve.

I desire to thank the people here to-night for the very kindly response they have given. I will remember this Corn Show for two reasons, for I tell you frankly I have never been at an agricultural gathering, outside of the gathering I attended at Belleville in connection with the Eastern Dairymen's Association, where there appeared to be such a right down thirst for knowledge, and a determination on the part of the people to do better, and make better the conditions in which they find themselves. All that is necessary is to have been in town this afternoon, to say nothing of attending this meeting. I dropped in this afternoon to see what was going on, and when I saw this hall full of earnest people listening to the men addressing them, I made up my mind that the work of Mr. McKenney had borne fruit, and the people of Essex and Kent had determined, that from this time forward, "Onward" would be their motto. And I am sure that with the encouragement that has been given you, the time is not far distant when you will be able to supply all the good seed corn that the people of the Province of Ontario require for ensilage purposes.

ADDRESS.

Prof. L. S. Klinck, Macdonald College, Quebec.

I can assure you that it affords me a great deal of pleasure to have the opportunity, this evening, of addressing this representative body of citizens of the town of Essex, and the surrounding country. I am particularly pleased to have the pleasure of speaking under the auspices of this Association, which has from its work appealed so mightily to the people of this part of the Province of Ontario, during its present session.

The first session of the Corn Growers' Convention, held last year, awakened a wonderful interest in this, your greatest cereal, and that awakened interest is proving a wonderful factor in the improvement of that crop. If I were to mention some of the points which, perhaps, are worthy of attention, I would say that that Convention brought to the attention of those interested in corn production the importance of paying stricter attention to these great crops. In the second place, it has stimulated a rivalry among those growing corn, and as the Minister of Agriculture has told you, it has awakened an interest regarding the use of these crops and the best methods of tillage and cultivation.

It has not only encouraged the selection of the seed and the study of varieties and soil, but it has also brought to your attention the importance of good agricultural methods, and as a result of this manifested interest in corn we have a much greater interest manifested in drainage, a question of vital importance to corn growers. I think the most important point which this Convention has brought out, is, that it has brought to the attention of all, the unity of interest between the farmers of this part of the country and the business man.

I well recollect the first meeting of the Convention last year. It was made up very largely of business men, who came out to hear what would be said. There were few farmers in attendance. The next day the attendance of farmers was very much larger, and the third day they far outstripped those who represented the business and professional men.

This year, while the business concerns have stayed with the movement from the beginning, and have lent their active interest and support, the farmers have come in such large numbers that unless we get here in time it is necessary for us to remain outside, in spite of the fact that we have now two places instead of one as we had last year. This has brought the attention of the people to the important fact that our interests are all one. As farmers we are inclined at times to be a little suspicious, and have more or less a little standoffishness, waiting to see if the thing is going to go. If it is going to go we are quite ready to lend it our most active support, and if it is not, then we do not want to be mixed up in the thing. This is commendable as far as it goes, but we must direct the attention of the people to the great fact that agriculture is the greatest occupation of this country, and we are vitally interested in the progress which the farmers of this country make. And what is the object of this Convention?—because no movement of this kind can be sustained unless there is some defined object, some good reasons why the movement should be set on foot, and why it should be supported and sustained? Unless there is some good object, then we have no good excuse for the expenditure of the money, and Mr. McKenney's time and energies have been spent for nought unless we are about to accomplish something that is really worth while.

The motto of this Association is, "Better corn and more of it," and I believe the reason the management called this public meeting to-night was just to give the men in the town of Essex, who have not been attending the meetings, an opportunity of knowing just what is going on in their midst, and to see if they cannot catch a little of the enthusiasm which seems to have caught hold of some of the people of the town. People have got so enthusiastic that they do not care to wait for the car in the morning; some men, I know, drove in ten miles in order to be here at ten instead of eleven o'clock. Some people say, "What do you do at these Corn Conventions, surely you do not take up all your time talking corn?" and they say, "I suppose you spend considerable time telling the farmers just how to select seed and how to handle everything in connection with corn crops." And then they say, "The farmer is considered quite conservative; in fact he is considered to be a little slow." All of you who have attended this Convention know that there is nothing further from the minds of the people than that. It was said that the speakers had come with the intention of telling the farmers "How to do it." Had the speakers done that this hall would not be full to-night. Those who come to this Convention come with a message, and I dare say that the speakers, without exception, gather as much information at this Convention as any man who has attended one or two of the sessions.

What have we done? The first day was preparation day, and then we talked a little corn. The next day a little more corn, and then judged a little corn and saw a little more and investigated about corn. The third day we talked about corn seed, and then a little more about corn. Semi-consciously we began to talk corn, and at dinner time we talked corn and we ordered corn for dinner, and I heard that some had corn both in meat and beverage. (Laughter.) During all this time the enthusiasm was growing, and this thirst for knowledge was evident in every way. I think that the next year will be very much the same as last year,

when some of the fellows came to me on the third day and said, "Do you know last night when I fell asleep I began to dream about corn. I thought it was summer, and I found myself out in the field looking for that good ear off the good stalk, and I got my seed corn selected in that way, and I strung it up and got it dry in a place where there was a good circulation of air and no danger of frost, and later I got a good test just as that fellow said it was best to do. I even went so far as to grade it properly and put it in a bag containing about a bushel, and strung it up ready for the spring." Another said he had spent a night judging corn—yes, many of them last year spent restless nights, and probably many will do the same to-night and to-morrow. That is what we are doing, awakening a little enthusiasm, a little interest in our business. To my mind the people who become the most enthusiastic, are not some of the young fellows. I like to talk to boys, and I know that it is very difficult to get hold of men who have grown gray in the business and get them enthused. I remember a few years ago meeting an old gentleman who came up to the short course. He was invited to a seat at the table to judge corn. "No," he said, "I am too old. I have grown corn for fifty years, and I guess I know a thing or two about it." Well, he was not urged just then, but a little later he was asked again, and he said, "I cannot see," and in addition to that he said he could not stand up for two hours. We got him a keg and put a plank on it and he sat down and began judging corn, and he was just as completely tangled up as most of you were about this corn. Fortunately the time was longer, and he became more and more enthusiastic, and he soon became so enthused that he wished to be allowed to spend all his time at corn, and as he was an old man that privilege was granted him by Prof. Holden. Toward the end of the course the old gentleman got up and said: "Boys, I have grown corn for fifty years, and had I the opportunity of learning fifty years ago the many points on corn that I know now, I would have revolutionized my county forty years ago. But," he said, "I did not know of these things, and I had got to that point where I thought there was nothing more to be known, simply because I had lived so many years and grown corn such a length of time. But now I want to notify you young fellows that it is up to you to brace up; because I am going in for the Whiting Trophy, and you will have to sit up nights if you beat me, and I will give a one hundred dollar gift to the boy under eighteen who brings out the best sample of ten ears to this show next year." He went home. He had one hundred and fifty acres of corn, and he said to his men, "Every ear that you think will be a winning one, bring to me at night, and I will take it and give you credit for it, and I will give you five dollars for each ear that is a winner. He worked over his corn in that way, and to make a long story short he won the trophy next year.

There was a man who had decided that he had lived too long on the farm and he was going to retire, but he is still a farmer. This was eight years ago, and he is getting a strain of corn that is winning money in the North-West to-day. And he has got something to live for and work for that is worth while. And if we can get hold of the old fellows like that, what is it going to mean for the young fellows? What is the cause of this enthusiasm? Simply that we have come to know the men who know corn and will get enthusiastic about it and sit up all night and talk about it.

Other subjects come in that bear directly upon corn production, such as cultivation, rotation and fertility of soil, but, after all, while corn is an important subject back of it lies the soil.

I think Pope said that the greatest study of mankind was man. Then it

seems to me the next greatest study is the soil, because man is wholly dependent upon the soil, and if it is true that agriculture is the fundamental support of this country, it is quite true that soil fertility is the absolute support of Canadian agriculture. Therefore, we must pay strict attention to our soil. I think J. J. Hill was not very far wrong when he said, "The high cost of living is the cost of high living." The other side is that of supplying the demand, and certainly the farmers are having their innings to-day. The supply does not come up to the demand. I do not see why anybody should complain. Goodness knows we have had hard times long enough, and I think we all rejoice to see that condition brought about. Larger crops and better corn and more of it, and if we make money we are going to spend it. I do not think any of us will swell our bank accounts. I am inclined to think that the majority of men interested in this work are interested in bigger crops, because of what it will bring to those who produce the crops, and after all, these are the things that are really worth while, if we have larger crops we will have better farms and better homes and better schools and better churches, and these are things that are really worth while.

I am not one of the men who think that a man who is interested in bigger crops is just interested in bigger crops because they are going to enable him to buy more land to grow more corn to feed more hogs to buy more land. That is not the rule. By having larger crops we will be able to give the boys and girls better chances. I am not at all in sympathy with the sentiment that I do not want my boy and girl to work as hard as I did. God knows, work never hurt anyone. But I believe the reason we are interested in this, is because it will enable us to give our boys and girls, not an easier time, but a better chance, and that is what this Association stands for in its broadest and best sense. Just so far, I am sure that we all wish it very great success.

ADDRESS.

PHIL BOWYER, M.L.A., RIDGETOWN.

I feel quite honored by the compliment you have paid me in asking me to address you this evening. I take it merely as a compliment, because at this late hour you are not looking for an address, and I did not come with a prepared one. I have not had the advantage of the other gentlemen who have spoken here to-night, or even of my fellow members of the Legislature, the Hon. Mr. Duff and Dr. Anderson, whom I believe do some farming. I have never had the privilege of farming, even in my younger days, and the only corn growing I have ever done has been on a very limited area—not over two feet. I might say, however, that I have taken a deep interest in this movement. I have been in close touch with the Corn Growers' Association on two occasions. One was a year ago, when I accompanied your most able Representative to our friend the Minister, who has spoken here to-night, to urge upon him to give a grant to the Corn Growers' Association. We succeeded in that, and then the day before I was leaving for Toronto I was called up by Mr. McKenney twice on the telephone, and I had pressed upon me with all the vigor that gentleman is capable of, two things; the first was, "You are to get an increased grant for us," and second, "You are to see that the Minister of Agriculture comes to Essex." We have not yet secured that grant,

but we were successful in the other part, and you have had the pleasure of listening to the Minister of Agriculture here this evening, and have learned that he takes great interest in the counties of Essex and Kent.

I know you have all been delighted, and I am sure that I have been delighted, not only with his address, but with the addresses of all the other gentlemen who have spoken. While I am not a farmer, I have every reason to believe that I shall be dreaming about corn for many a night. I have thoroughly enjoyed myself at this Convention. I liked the speeches, I enjoyed the singing of the young ladies, and every part of the Corn Show, and I feel proud that the greatest ear of corn I saw there, and the largest ones came from East Kent.

Another thing which has pleased me is that our eloquent chairman comes from the county of Kent. Kent does not grow as much corn as Essex. You grow six million bushels, while we grow only five millions, but we are growing corn and a few hundred thousand bushels of beans, and I think some bean growers from Kent were here last night discussing the matter of amalgamating with, or becoming associated with the Corn Growers. They broached the subject to me, and talked of forming a Bean Association. I said it would never do to have too many of these Farmers' Associations, but what you had better do is to amalgamate with the Corn Growers, and style it a Corn and Bean Growers' Association. You might also take in tobacco, and then it would be a Corn, Bean, and Tobacco Growers' Association. Your exhibition would be larger because you would have Corn, Beans and Tobacco. Your show could be held one year in Kent and the next year in Essex. There would be more variety, you would attract more people, it would be less expensive to carry on, and the Government would only have one grant to make. I think the Government would rather give an increased grant to a united association, than a small separate grant to two or three associations. I do not know whether the Minister of Agriculture merely hinted at a larger grant or whether he was plain about it.

I had six letters sent to me lately asking me to support a grant to the Fairs' Association of $30,000 more than they are getting. I answered that I certainly would be pleased to support any reasonable grant that the Government could give the Agricultural Institutions of this Province. But I said, "Let me remind you that while it may be difficult for the directors of the Agricultural Societies and other Associations to carry on their work, the Government, itself, has financial difficulties." I have heard the present Treasurer of Ontario say, "So long as the money comes in, we are ready to spend it in the interests of the people; but it is my duty to see that we do not spend more than we take in." We must not encourage deficits. We have not had any deficits so far, and as the revenue has increased we have given larger grants to agriculture and education. There is no mysterious, providential, Heaven-made channel through which money is running into the Provincial Treasury at Toronto. The Government must be able to see where the money is coming from. It will never do to dole out money indiscriminately to each and every person who asks it. But that is not to say that the Government should not increase the grant to over $70,000. I merely wished to remind these gentlemen that it was easy for them to ask for $30,000 and easy for the secretary to send me a copy of the resolution.

I also wish to say to the gentlemen clamoring for more money, that if the Government does accede to your request, do not let me see you at a political meeting at the next general election applauding any speaker who points out in a loud strong voice "The great increase of the expenditure in the Province of Ontario

under this Government." Remember that you asked for it. That is very plain talk, but that is the way I always talk, and it has never hurt me yet.

While members like to get all that they can for their constituents, you must remember that we are only trustees, and we must be wise trustees, and the Government has not money without limit to give. The Government has been very liberal, and our good friend the Minister of Agriculture is always sympathetic when we talk about grants to Fairs or Farmers' Institutes. The present Minister has proven a worthy successor to the Hon. John Dryden and the Hon. Nelson Monteith, and the only reason he will not give all we ask for is simply that everything must go before the Provincial Treasurer, and he is a "watch dog of the treasury," if ever there was one. If the money were his own he could not husband it with greater care, and he is fully determined that, so long as he is the Treasurer of the Province, while he is willing to give to the people all the revenue he can, he will not promise an expenditure that will exceed the revenues.

I am satisfied that you will get all the grants and all the aid and assistance that this Government can possibly give you, and that is all I have to say.

SOME POINTS TO CONSIDER WHEN PREPARING A SAMPLE OF CORN FOR EXHIBITION.

1. Select your corn in ample time to have it thoroughly dried before the show.

2. In making the final selection, lay the ears out on a table where the light is good, placing the butts of the ears even with the edge of the table. This will facilitate the making of a close comparative study of all ears likely to be eligible for your sample.

3. Next get out your best ear. With this before you as your standard, pick out the required number which conform most closely to it in all the essentials that go to make a good ear.

4. When you have satisfied yourself that you have the best ears out, so far as this can be determined from an outward examination, remove a representative kernel from the middle of each ear and place it on the table, germ side up, in front of the ear from which it was taken.

5. Then make a comparative study of the kernels. All ears showing poorly shaped kernels, and those giving evidence of impaired vitality should be discarded, and ears of better quality substituted. No judge will take objection to a missing kernel or two if they have been taken from the place indicated, as this is the only way an exhibitor can determine the shape and quality of his kernels. Removing kernels for this purpose is very different from removing mixed grains and substituting others therefor. In a close contest the latter would be regarded as a disqualification.

6. After the best ears, as shown by conformation and quality of ear and kernel, have been chosen, it is allowable to groom the sample. The cob at the butt may be trimmed, silks may be removed and the ears straightened if necessary. Exposed tips, however, should not be removed.

7. Having gotten the sample into show shape do not leave it, even over night, in a place where mice can possibly get at it. The inherent fondness of these animals for this grain has ruined the sample of many a hopeful prospective exhibitor.

8. In packing the sample for shipment do not place the ears loosely in a bag or basket. Wrap each ear separately in newspaper being especially careful to protect butts and tips; then pack snugly in a box so that the ears cannot shift.

9. See that your name, together with the proper entry, is on the inside as well as on the outside of the box.

10. No matter whether you come within the money or not, take your corn home. If you have done justice to yourself in making your selection, you will have in your sample, so far as one can judge by a physical examination, the very best seed ears in your entire crop. They should be worth more to you than to anyone else. You cannot afford to lose them Take them back. They will form an excellent nucleus for next spring's seed block.

Fortieth Annual Report

OF THE

Entomological Society

OF ONTARIO

1909

Published by the Ontario Department of Agriculture, Toronto.

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To the Honourable JOHN MORISON GIBSON, K.C., LL.D., etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

The undersigned begs to present herewith for the consideration of your Honour the Report of the Entomological Society of Ontario for 1909.

Respectfully submitted,

JAMES S. DUFF,

Minister of Agriculture.

Toronto, 1910.

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FORTIETH ANNUAL REPORT

OF THE

Entomological Society of Ontario

1909.

To the Honourable James S. Duff, Minister of Agriculture.

Sir,—I have the honour to present herewith the Fortieth Annual Report of the Entomological Society of Ontario, which contains the proceedings of the forty-sixth annual meeting of the Society, which was held at the Agricultural College, Guelph, on the 4th and 5th November, 1909. The report includes the papers read and the reports submitted by the various officers and branches of the Society.

"The Canadian Entomologist," the monthly organ of the Society, has been regularly issued during the past year, and has now completed its forty-first volume, which has maintained the high scientific standard of its long series of predecessors.

I have the honour to be, Sir,

Your obedient servant,

Charles J. S. Bethune,

Editor.

Ontario Agricultural College,
Guelph.

Entomological Society of Ontario.

OFFICERS FOR 1909-1910.

President—Tennyson D. Jarvis, B.S.A., Lecturer in Entomology and Zoology, Ontario Agricultural College, Guelph.

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Secretary-Treasurer—J. Eaton Howitt, M.S.A., Lecturer in Botany, O. A. College, Guelph.

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Librarian—Rev. C. J. S. Bethune, M,A., D.C.L., F.R.S.C., Professor of Entomology and Zoology, O. A. College, Guelph.

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Editor of the "Canadian Entomologist"—Rev. Prof. Bethune, Guelph.

Delegate to the Royal Society—Rev. Dr. Fyles, Hull, P.Q.

Auditors—Prof. S. B. McCready, and J. W. Crow, B.S.A., O. A. College, Guelph

CANADIAN MEMBERS OF THE ENTOMOLOGICAL SOCIETY.

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Winn, A. F.....Montreal.

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Wallis, J. B.....Winnipeg.

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Smith, Prof. J. B.....New Brunswick, N.J.
Uhler, P. R.....Baltimore, Md.
Webster, F. M.....Washington, D.C.
Wickham, Prof. H. F.....Iowa City, Iowa.

LIFE MEMBER.

Saunders, Dr. William.....Ottawa.
Director of the Experimental Farms of the Dominion.

Entomological Society of Ontario.

ANNUAL MEETING.

The forty-sixth annual meeting of the Society was held at the Ontario Agricultural College, Guelph, on Thursday and Friday, November 4th and 5th. During the day meetings the chair was taken by the President, Mr. Tennyson D. Jarvis, and at the evening session by Dr. Bethune. Amongst those present were Messrs. H. H. Lyman and A. F. Winn, Montreal; Dr. C. G. Hewitt and Mr. Arthur Gibson, Central Experimental Farm, Ottawa; Mr. John D. Evans, Trenton; Mr. F. J. A. Morris, Trinity College School, Port Hope; Dr. E. M. Walker and Messrs. C. W. Nash and J. B. Williams, Toronto; Mr. R. C. Treherne, Grimsby; President Creelman, Profs. C. A. Zavitz, R. Harcourt, S. B. McCready, C. J. S. Bethune, Messrs. Jarvis, Howitt, Caesar, Eastham, Crow, Klinck, of the staff, and a large number of the students of the Ontario Agricultural College and the Macdonald Institute, Guelph.

Letters expressing regret at their inability to attend were received from Prof. C. C. James, Deputy Minister of Agriculture for Ontario; Dr. William Saunders, Director of the Dominion Experimental Farms, Ottawa; Rev. Dr. Fyles, Hull, P.Q.; Messrs. Paul Hahn and A. Cosens, Toronto; G. Chagnon, Montreal; C. E. Grant, Orillia; W. E. Saunders and J F. Calvert, London; R. S. Hamilton, Galt; Prof. W. Lochead and Mr. J. M. Swaine, Macdonald College, P.Q., and others.

A business meeting of the Council was held in the Biological Building, at which their report was drawn up and various matters discussed. On motion it was decided to contribute the sum of fifty dollars to the fund for the erection of a memorial drinking fountain to the late Dr. James Fletcher at the Experimental Farm, Ottawa.

In the afternoon the Society met at 2 o'clock in the Biological Lecture room, where there was a goodly attendance of members and students. The first order of proceedings was the reading of the reports of the Directors on the noteworthy insects of the year in their respective districts. Owing to various circumstances, none were received from Mr. C. E. Grant, of Orillia, representing Division No. 2, nor from Mr. R. S. Hamilton, Galt, of Division No. 6.

REPORTS ON INSECTS OF THE YEAR.

Division No. 1.—Ottawa District. By Arthur Gibson, Central Experimental Farm, Ottawa.

The season of 1909 in the Ottawa District, although cool and late in spring, was an excellent one for growth of all kinds. The rainfall during the whole season was rather above normal, and there was, comparatively speaking, but little hot weather, and this not until the middle of August. Injurious insects, as a whole, were not so troublesome as they were in 1908.

The following notes probably cover those insects which were most complained of in the District during the past season.

Attacking Field Crops.

The Hessian Fly (*Mayetiola destructor,* Say.) which was troublesome near Ottawa in 1908, was not reported as present in 1909. On the Central Experimental Farm, where it occurred last year, no trace of its work could be detected this year.

Grasshoppers were decidedly destructive in many localities near Ottawa, particularly in places where the soil is light. On June 21st I received a report that these insects were causing much anxiety to farmers near Buckingham, Que., about 23 miles from Ottawa. It was stated that they were present in that district in "countless millions." Up the Gatineau River grasshoppers were enormously abundant, and many complaints were made concerning their ravages. On July 29th I drove from Maniwaki to Baskatong, Que., a distance of about 40 miles, and saw the insects in great swarms. Oats, which are largely grown in the Gatineau country, were much damaged, also timothy; the crops in some fields being entirely eaten. At Baskatong I visited a large field of turnips, the tops of many of which had been completely eaten, and what remained was rapidly being devoured by the grasshoppers. At Castor, Que., which is about half way between Baskatong and Maniwaki, one farmer had sown turnips twice and had lost both crops. On July 30, the grasshoppers were working in his oat and wheat fields. I was much amused at a method which was being adopted to save the crop of turnips at Baskatong. A s mall boy was kept walking up and down the rows of turnips with a branch in his hand, with which he endeavoured to drive off the grasshoppers. Of course, almost as soon as he had passed, the insects immediately swarmed back to the plants and continued their work of destruction. The species which was responsible for the damage was the Lesser Migratory Locust, *Melanoplus atlanis,* Riley. I advised them to try the Criddle mixture, which had given such remarkable results in Manitoba. The following quotation is from a letter I recently received from Mr. Criddle, of Treesbank, Man., who devised this mixture: "There has been another rather bad outbreak of locusts here, which has necessitated several applications of the Criddle mixture. The result has been entirely satisfactory, the mixture having undoubtedly prevented much damage. I was beginning to be afraid that I had over-estimated the value of horse droppings as an attraction, but I am glad to find that such is not the case."

The Grain Aphis (*Macrosiphum granaria,* Kirby) was present in large numbers in the Ottawa District. In the Gatineau country I saw many fields, at the end of July, which were infested. Fortunately, the outbreak, as usual, was attended by parasites which greatly reduced the numbers of the plant lice. Some fields of oats, however, at the above date, looked as if they had been much weakened by the attacks of this insect.

The Greater Wheat-stem Maggot (*Meromyza Americana,* Fitch.) was conspicuously present in wheat near Ottawa. Larvæ collected on July 9th were apparently full-grown, being about a quarter of an inch in length. In some experimental wheat plots on the Central Experimental Farm the "silver tops" or "dead-heads," as they have been called, were rather abundant, but were not present, however, in sufficient numbers to affect materially the resultant crop. They were especially noticed among wheat of the variety called "Bishop."

The Apple-leaf Hopper (*Empoasca mali,* LeB.) which did so much harm in eastern Ontario in 1908, was again present on potatoes in injurious numbers in the Ottawa district. Its work was supplemented very much this year, however, by the Potato Aphis and the Potato Flea Beetle, particularly the former. On October

6th, I was present in a field when the potatoes were being harvested, and was surprised to see the crop so poor. I was told that the above insects were largely responsible for the small crop. On the 14th of September, when examining some potatoes, I noticed many of the nymphs of the Apple Leaf Hopper, and on the same day in an orchard close by, the adults were flying in thousands around apple trees. On July 14th some of the mature insects were noticed on potatoes on the Experimental Farm. Up to this date I had not heard of any damage in the Ottawa district by this insect.

The Potato Flea Beetle (*Epitrix cucumeris,* Harr.), besides injuring potatoes, as above mentioned, attacked to a very noticeable extent a number of plants of the Wonderberry which were growing a short distance away. The Flea Beetle was not present in the district in such numbers this year as it was in 1908. As a rule it is more numerous in hot dry summers.

Root Maggots were not much complained of in the district during 1909. They were present, of course, as they always are, but as far as I can learn, not much damage has been done by them. On the Experimental Farm, for instance, hardly an onion was destroyed by these larvæ. On September 14th I saw them working to some extent in an experimental row of winter radishes.

Cutworms were present, as usual, in injurious numbers. At Carp, about 20 miles from Ottawa, an outbreak occurred towards the end of June. Mr. Sirett, the resident representative of the Ontario Department of Agriculture, reported the matter to me, but unfortunately specimens of the larvæ were not received. Mr. Sirett thought, however, that the species was the Variegated Cutworm, *Peridroma saucia,* Hbn. Injury was done to field crops, but just what these crops were, I did not hear. About the middle of July the Red-backed Cutworm was present in fair numbers in a large field of mangels on the Experimental Farm. The larvæ on the 15th July were about full-grown. An application of poisoned bran soon stopped any further injury.

The Striped Cucumber Beetle (*Diabrotica vittata,* Fab.) was particularly numerous during the past season. It appeared on some cucumbers in my garden on June 15th, just as the plants were up nicely. On July 3rd I saw many in copulation. At Billings Bridge, near Ottawa, it was particularly reported to be injuring squashes. It also to some extent attacked melons, and was complained of by many of our market gardeners. As this beetle is very active, any application of poison must be frequently renewed. The leaves should be dusted with Paris green mixed with land plaster or lime in the proportion of one pound of the poison to fifty of the diluent, if necessary every second day. Bordeaux mixture is also a useful remedy for this insect as well as for the Cucumber Flea Beetle which often does serious injury.

The Black Blister Beetle (*Epicauta pennsylvanica,* DeG.) appeared suddenly at several places in the district, and did locally noticeable damage, particularly to potatoes and tomatoes. Plants in flower gardens were also attacked, and in some instances the foliage completely eaten. In one garden near Ottawa 100 splendid Clematis plants were defoliated, the beetles appearing on the 23rd June. On June 28, they were present in conspicuous numbers in the Arboretum of the Central Experimental Farm and were attacking plants of the genus Thalictrum, in the perennial border. As is well known, these beetles in their larval form are predaceous on the eggs of grasshoppers, so generally speaking it is not advisable to destroy them with arsenical sprays. They can often be driven from a crop by several boys walking across it and waving from side to side a bough of spruce or other conspicuous branch. As these beetles are easily disturbed they will fly ahead, and on reaching the edge of the crop will disperse and as a rule not return

Attacking Fruit Crops.

The fruit crop in the Ottawa district was on the whole a very fair one. Weather conditions have been excellent for the maturing of fruit. Insects have not been especially destructive, and growers who sprayed their trees regularly were not much troubled.

The Codling Moth (*Carpocapsa pomonella,* L.) did a good deal of damage in unsprayed orchards in Eastern Ontario. The intelligent fruit growers of the district, however, were not troubled to any serious extent by this insect. A friend who lives at Aylmer, Que., about 9 miles from Ottawa, told me that every apple in his garden was wormy. He had, of course, neglected to spray his trees.

Plant lice were the insects which were most abundant in orchards in the district during the past year. The season has been a remarkable one for plant lice of all kinds. Apple and plum trees were badly attacked, and where small trees were infected, serious damage resulted. During the early part of June the plant lice were enormously abundant in orchards near Ottawa, but towards the end of the month it was noticed that important parasites were appearing and doing splendid work in reducing their numbers. When orchard trees become badly infested with plant lice, it is a difficult matter to destroy the insects, on account of the curled up condition of the leaves, making it almost impossible to reach the insects with any contact insecticide. In eastern Canada, fortunately, these insects do not, as a rule, seriously injure apple trees, but in British Columbia, the Apple Aphis is in some years decidedly destructive, and frequent treatment is necessary. The Woolly Aphis of the Apple was fairly prevalent in the Ottawa district during the past season. On September 14th, I saw a number of young apple trees which were much infested.

The Pear-tree Slug (*Eriocampa cerasi,* Peck.) was again noticeably present on plum and cherry. The foliage of some trees examined in September was much eaten by the slimy dark coloured slugs of this sawfly. The insect is one which is easily controlled by spraying with any of the arsenical poisons.

The Currant Worm (*Pteronus ribesii,* Scop.) was complained of by growers of currants. The second brood of larvæ were very numerous in a large patch of red and white currants near Ottawa on July 12. They first appeared a few days before this date, and were quickly stripping the bushes of their foliage. The first brood of this insect, which appears when the leaves are attaining full size, are easily controlled by Paris green or arsenate of lead, but for the second brood, which appears just as the fruit is ripening, white hellebore is recommended, either dusted upon the bushes, or applied as a spray, one ounce in two gallons of water. The first brood should be treated thoroughly so as to reduce the numbers of the second brood.

The Currant Aphis (*Myzus ribis,* L.). Almost wherever currants were grown the past season they were attacked by large numbers of this plant louse. In eastern Ontario we received many complaints of the work of this insect. Unfortunately, unless the bushes are sprayed with kerosene emulsion or whale-oil soap, as soon as the aphides appear, and before they cause the leaves to blister and curl, it is difficult to get good results from the work. It is necessary to force the liquid well up beneath the leaves. This can be done by attaching a piece of bent pipe, bearing the nozzle at the end, to the rod of the sprayer.

Attacking Forest and Shade Trees.

Cankerworm larvæ were more abundant in the spring of 1909 than they were in 1908. On the 4th June they were half grown. At Beechwood, just outside of Ottawa, beech trees were badly attacked, the result of their depredations being easily seen. When ornamental trees are attacked by these caterpillars, it is important to apply the arsenical poison while they are small. They can then be easily killed at the ordinary strength used for leaf-eating insects. When they are more than half an inch long they are a good deal more difficult to kill, and consequently much stronger sprays must be used.

The Spiny Elm Caterpillar (*Euvanessa antiopa,* L.) was abundant on elm trees throughout the district. On June 21, larvæ about one and a quarter inches long were noticed. Specimens which were collected had become full grown and changed to chrysalids by July 10. The species is intermittently abundant at Ottawa, and some years it is not an uncommon sight to see small elm and willow trees entirely stripped of their foliage.

Elm trees seemed to be particularly attacked by insects during the past season. The Woolly Elm-leaf Aphid was very abundant and many enquiries were received concerning it. By the middle of June the conspicuous colonies were much noticed. The Cockscomb Gall was also numerous in the district, the leaves of many elm trees being covered with these galls. Near Maniwaki, Que., on July 29, I saw large numbers of the Plum Gall, *Pemphigus ulmifuscus.* The galls were large and on most of the leaves of the infested trees there were at least two and very often three or four galls present.

The Spruce Budworm (*Tortrix fumiferana,* Clemens.) This insect caused much anxiety among the lumbermen of the Ottawa district. Reports were received from the upper Gatineau that some insect was ravaging the spruce and balsam forests, and as a result I was sent up into the infested area to find out the nature of the trouble. The result of this investigation is given in a separate paper which I hope to present shortly. At Ottawa, thousands of the moths were noticed flying around bushes and trees of all kinds on July 20th. They were even abundant all through the city, and on almost any bush or tree being disturbed, many of the moths would fly out from the foliage on which they were resting.

The Larch Sawfly (*Nematus Erichsonii,* Hartgn.) was also very prevalent wherever larches were growing. It was noticed in considerable numbers on some ornamental larches on the Experimental Farm, on July 20, and at this time the larvæ were about full grown. Up the Gatineau River from Ottawa as far north as Baskatong, I noticed all through this area at the end of July the results of the work of this larvæ. Many trees were entirely stripped of their foliage. Along the railway, between Ottawa and Montreal, the defoliation of these handsome trees was also conspicuous.

The work of the Spruce Sawfly was also noticed to some extent north of Maniwaki, and larvæ were found to be full grown on July 30. At this date most of the larvæ had disappeared.

The Bronze Birch Borer (*Agrilus anxius,* Gory.) is seriously injuring birches in the Ottawa district. The result of the work of this insect is easily seen at the Central Experimental Farm, where practically all of the cut-leaved birches are dying. This insect has not been mentioned very much in Canada as yet, but in northern portions of the United States it has done a good deal of damage. The presence of this borer is soon shown by the dying of the tops of the trees. This

is owing to the fact that the insect first attacks the tops, which results in the killing of the upper limbs.

The Fall Webworm (*Hyphantria textor,* Harr.) was again present in conspicuous numbers throughout Carleton County. Larvæ were seen to be just emerging from the eggs at Ottawa on July 8, and a small nest on lilac was observed on July 14, the caterpillars in which were only a day or two old. Full grown larvæ were noticed as late as the 6th October.

Attacking Garden Plants.

The Tarnished Plant Bug (*Lygus pratensis,* L.) was very troublesome in gardens the past season. As is well known, this insect not only does injury by sucking the juices from the leaves, but it also pierces the flowers of many plants, thus destroying them. In September the adults were present in thousands around apple and other trees. As they pass the winter in this state, beneath almost any surface shelter, it is important that all garden rubbish be burned in autumn, so as to reduce the hibernating quarters for this and other kinds of injurious insects.

The Destructive Pea Aphis (*Nectarophora pisi,* Kalt.) was again present in 1909 in the district, on sweet peas in gardens. The first colonies were noticed on July 26. At this date I could not find any winged specimens. The attack, however, was not nearly so severe as the outbreak of 1908. In early September I noticed that the parasite *Megorismus Fletcheri,* Crawford, which was described in the *Canadian Entomologist* last March, from Ottawa material, was present in goodly numbers. From parasitized plant lice collected on September 2nd, I secured a further series of the parasites, the specimens emerging on September 15.

Many plants in gardens were seriously injured during the past season by Red Spider. At the Central Experimental Farm, towards the end of July, Phloxes particularly were seen to be dying from the work of this mite. Few garden plants are free from its attack, and as these creatures are so small, their work is generally unnoticed until a good deal of harm has been done. Flowers of sulphur are useful in destroying Red Spider and may be applied in the proportion of one ounce to every gallon of water. As the mites occur chiefly on the underside of the leaves, the spray should be forced up from beneath so as to reach them.

The interesting and rare little Tortrix (*Sparganothis flavibasana,* Fern.) was again rather destructive on a few bushes of Lonicera of the Caprifolium group at the Central Experimental Farm. This is the third year in succession that this insect has appeared on the same bushes. This year the larvæ were mature on June 15.

Division No. 3.—Toronto District. By J. B. Williams.

The Tussock Moth has been, as usual, quite plentiful on many of the shade trees in the city streets.

At the beginning of the summer the Park Commissioner had many of the trees sprayed with arsenate of lead, and later on, towards the fall, several gangs of men were employed to collect the cocoons; but the city appropriation was not sufficient to do the work thoroughly, and as a further grant was refused, the work of collecting the cocoons has come to an end for the present year, just at the time when it might be most successfully pursued.

Early in the summer one of the Park Commissioner's men brought me a sample of Elm bark covered with a scale that was doing much damage to several

trees. I sent it to Mr. Gibson at Ottawa, and he determined it as the Woolly Elm-Bark Aphid (*Schizoneura Rileyi*). They have treated some of the infested trees with whale oil, as Mr. Gibson recommended, and found the results satisfactory.

The Aphid seems, at first, to have been confined to small trees; but Mr. Cameron, the Park Commissioner's assistant, says that it has also begun to attack the small branches of the larger Elm trees, and he fears that it will give them a good deal of trouble before it is eradicated.

Prof. Ramsay Wright had during this summer a good many of his dahlias injured by a bug, which pierces the plant just below the flower bud, and so spoils the blossom. He brought a specimen down to the Museum, but it was mislaid somewhere so that I cannot give the name of the species.

I asked another gentleman, who grows dahlias in the west end of Toronto, if his plants had been injured in this way. He replied that he had not seen any bugs on them, but his dahlias had been a failure this year. Perhaps the bugs may have done some of the mischief without being detected in it.

Division No. 4.—East Toronto District. By C. W. Nash, Toronto.

The summer of 1909 was remarkable for the dearth of insect life in this neighborhood. Even such butterflies as the Cabbage White, Clouded Yellow and Monarch were remarkably scarce and little or no damage was done by the larvæ of the Cabbage butterfly in the large market gardens of East York. The Monarch (*Anosia archippus*), which usually appears early in June was not seen until the first week in July. From that time to early September, when the southward flight takes place, only an occasional specimen was visible. No great host of these insects passed from east to west when migrating as in former years, so that if they do not breed in the south this winter it would seem probable that the species would be very rare in Canada next summer.

Papaipema cataphracta, the larvæ of which, by boring into the stems of plants, have during the last few years done much mischief in flower and vegetable gardens, were not noticed at all this season nor did I find *P. purpurifascia* in the roots of Aquilegias.

It would be interesting to know the cause of the almost total disappearance of *Cosmopepla carnifex.* For some years this insect increased yearly with astonishing rapidity, reaching its maximum in 1907, when the stems of all the Aquilegias, Penstemons and some few other plants grown near here were literally covered with them. In 1908 their numbers were greatly reduced and this last summer I only saw one specimen. There were no evidences of parasites having attacked them. It seems probable, therefore, that weather conditions of last winter were unfavourable and that they perished while hibernating.

The larvæ of the Tussock Moth though extensively parasitized in 1908 were about as abundant as usual on the shade trees of Toronto.

Various matters referred to in the Directors' Reports were discussed by Messrs. Caesar, Treherne, Hewitt, Bethune, Jarvis, Tothill, Nash, Gibson and others. The Woolly Aphis was stated to be rarely found on the roots of apple trees in the Niagara district; it hibernates as a stem-mother in the crevices of bark, and early in spring new colonies are produced. It was reported that in many parts of Ontario, where grasshoppers were so abundant this year, the Criddle mixture was found to

be entirely effective, though in one or two localities complaint was made that the grasshoppers would not touch it. This failure may have been caused by some defect in making the mixture or in the mode of application. In Manitoba this year it has proved to be an excellent remedy.

The Tussock Moth was said to be on the increase in country districts, though largely kept in check by its parasitic enemies. In Toronto the methods employed for its control were much criticized; spraying was done towards the end of July when a large proportion of the caterpillars had ceased feeding; those in charge of the operation had so little experience that they used nozzles that were too coarse, and allowed the pavement and roadway to receive more of the arsenicals than the trees. Subsequently the gathering of cocoons was begun much too soon and then the appropriation was exhausted and further supplies refused when this part of the work might have been performed most effectively.

OBSERVATIONS ON A FEW INSECTS OF THE SEASON.

By Lawson Caesar, Ontario Agricultural College, Guelph.

A year ago last June, when in the vicinity of Niagara-on-the-Lake, I happened to notice a number of white pine trees that seemed to me to have an abnormally large number of dead twigs. On investigation it seemed evident that some sort of borer had been the cause of their death as every twig had a longitudinal hole in the wood and a considerable amount of castings at the entrance. No insects, however, were found in the tunnels or on any of the twigs examined. On the 21st of June of the present year I was in the same district and again examined the same trees. Once more it was clear that borers had been at work. After examining as many twigs as time permitted four specimens of beetles were found in the tunnels. Two of these belonged to one species and the other two to another, but they were all apparently Scolytids. The larger species was not more than about half the size of the Shot-hole Borer (*Scolytus rugulosus*), and the smaller species was only half the size of the larger.

Not having seen this injury elsewhere I thought that it might be the work of some dangerous pest that had just crossed the border and might later on spread through our pine forests. Accordingly I sent specimens of the injured twigs to Dr. Hopkins, of Washington, who has charge of Forest Insect investigations. No beetles were sent with the twigs because I supposed he would be perfectly familiar with their work and could tell me the cause without them. His letter is as follows:

"I have your letter of the 22nd. instant and the specimen of white pine twig that has been injured by a beetle. I examined the specimen and find the work of the beetle, but to my great disappointment no insect could be found. This is a most interesting example of injury, differing from anything I have seen in the East, although I have seen something like it on the Pacific Coast and in the Rocky Mountain region. Therefore I wish you would send a good supply of infested twigs in order that I may be sure to get the beetle. It is evidently a scolytid, but without specimens it cannot be identified. The blighted appearance of the twig is similar to that which was very prevalent throughout northern New England last summer, but in our quite extensive investigations, in which many different causes were found for the dying of the twigs, we did not find evidence of the work of this insect. Therefore the matter is of special interest, and I hope you will send us plenty of specimens without delay, for fear that they may leave the twigs. After we have made a study of the matter we will be very glad to give you further information on the subject."

On receipt of this letter I at once sent all the specimens I had with a request that he keep one of each species and return the other two. A considerable number of twigs were also sent through the kindness of Mr. Alfred Eastham, who happened to be about to visit the infested district. Dr. Hopkins in reply to my note accompanying the specimens said:

"I have your letter of the 1st. inst., and two specimens of balsam mounts, also two specimens of beetles mounted on card points, and have just now received a bundle of pine twigs collected July 6th, at Niagara-on-the-Lake.

"The beetles in balsam are evidently a species of *Pityophthorus*, but it is impossible to identify them beyond the genus when mounted in this way, and even the genus is uncertain. They are far better for identification mounted dry. The other two specimens on card points represent an undescribed species, evidently of the genus *Conophthorus*, and is allied to a number of species that we have found to be injurious to the living twigs of pine, Douglas fir, etc., in the Western States. I am retaining one of the specimens for further study, and am returning the others to you as requested.

"The specimens of twigs are of unusual interest. A superficial examination seemed to indicate that they represented the common troubles investigated in New England last season, which were found to be due to several causes. A more thorough examination, however, revealed the fact that certain of the twigs with a peculiar grayish appearance were infested with living larvæ, apparently a *Pityophthorus*, and in one dead twig an adult *Pityophthorus* was found. We shall have no trouble in rearing these larvæ to the adult stage, after which we shall be able to identify them and shall write you further.

"One or two forms of the twig blight are also represented by the specimens sent, one associated with a light yellow spot on the twig, which is believed to result from the presence of the nymph of spittle insects, which are often very abundant on pine twigs. Some of the twigs are also thickly infested with *Chermes pinicorticis*, which reduces the vitality of the twigs and trees. These *Chermes* are of special interest, because they have alternate hosts, that is, one or more generations will develop on pine and then migrate to spruce, where they cause galls on the twigs, from which they migrate back to the pine, larch, etc., and there is one form of twig blight which is commonly met with where the white pine and spruce grow together. If, later in the season, you find that twig blight is developing under such conditions, I shall be very glad indeed to have specimens of the twigs."

It is too soon yet to expect any further word from Dr. Hopkins.

I have not had much chance to visit districts where the white pine is found so that I cannot at present say just how far this insect has spread through the province, but since Dr. Hopkin's last letter I have found its work in a pine grove about three miles south of Stoney Creek, and Mr. Jarvis has found it in Peel county near Inglewood.

It is quite clear that if these beetles were to become very abundant they could do enormous damage to our pines. So far they can hardly be said to be very serious, although about five per cent., or possibly more of the twigs have been killed. Trees that were infested last year did not seem any worse infested this year.

It must not be supposed that all the dead twigs seen on pine trees are killed by these insects, because in several districts numerous twigs had died, but on examination there was no evidence of any insect work.

Last year when in Prince Edward County I observed what was to me a new kind of injury on apples. It took the form of small, circular, brown, dead areas about one-quarter of an inch in diameter and one-eighth in depth. The skin over these cavities was always ruptured in the centre. Apples thus damaged were shown last year at our annual meeting, but no one seemed to know the cause. A few weeks after the meeting on looking over Prof. Crandal's excellent bulletin on the Plum Curculio I felt convinced that this insect had done the injury; consequently this autumn I asked Mr. McVannel, the Agricultural Representative at Picton, to see whether he could find any of the Curculios at the work. He discovered two early in September, and on the twenty-fifth of the same month, while in the same county, I found four of the insects at these cavities, two of them having just finished making fresh ones.

The apples worst attacked so far as I could discover by a very limited inspection were Golden Russet, Cranberry Pippin, Ben Davis and Snow. Spy and other varieties with very glossy surfaces seemed to escape. Some of the above mentioned varieties had as many as twenty injuries on a single apple, the majority of them usually being found near the calyx. Orchards that were not cultivated were, as one would naturally expect, much worse damaged than cultivated ones.

This sort of injury is done by the newly emerged beetles before they hide away for the winter and seems to begin about the third week in August and continue to the first week in October or possibly a little later.

It is rather remarkable that there is not considerable loss from this cause in the western counties of Ontario when it is so common in Prince Edward county and, as I have lately been informed, in the counties further east. Prof. Crandal states that in Illinois apples are often severely damaged by these feeding punctures, and Prof. Quaintance says that this sort of injury is especially common in the colder states and districts of North America.

A few interesting cases of parasitism have been observed during the season. For the previous two years the Shot-hole Borer (*Scolytus rugulosus*) has been doing great destruction to cherry, peach and plum trees in the Niagara district. Some fruit-growers lost as high as sixty trees in a single year. Many were afraid that the destruction would increase year by year and endanger the fruit industry. Very fortunately this year the borers have not done nearly so much damage. The reason for this seems to be solely the great increase in parasites. Early in the season, from a small piece of branch only a few inches long, I reared fourteen parasites. In September, while visiting St. Catharines and the surrounding district, numerous parasites could be seen on trees that had been attacked by the borers. A number of these were brought back and proved to be the same as most of those reared in the spring. All the parasites obtained so far are Chalcids, and much the commoner species is, so far as I have been able to determine it, *Chiropachys colon*.

On the trip on which the parasites of the Shot-hole Borer were found in abundance I was also requested to have a look at a maple tree that was said to be covered with some species of scale. On examining it I saw that the insect was the much dreaded Terrapin Scale (*Eulecanium nigrofasciatum*). On first sight I felt sure that the tree would have to be cut down and burned, but on closer evidence it was seen that nearly all the adult scales had been parasitized and there were only a comparatively small number of the living immature scales present. As it was quite clear that the parasites were looking after the scale in a satisfactory manner I informed the owner of the tree that he need not do anything except leave these friends to fight the battle for him.

One regrets to have to report that two of our worst insects have spread to new districts. The San José Scale has been found in one orchard in Prince Edward county and has come safely through the winter on nursery stock planted there last year. Efforts are being made by the provincial authorities to stamp it out before it can become well established and spread.

The other insect is the Railroad Worm. I have received specimens of apples infested by it from Bowmanville and from Cobourg, the latter having arrived only a week ago.

One new pest, the Blackberry Miner (*Scolioneura capitalis*) is becoming very abundant, especially in the Niagara district, and threatens to cause great loss to growers of this fruit unless a remedy can soon be found or parasites come to the rescue.

NESTS OF THE BROWN-TAIL MOTH IN IMPORTATIONS OF FRENCH NURSERY STOCK, 1909.

By Arthur Gibson, Central Experimental Farm, Ottawa.

The inspection work in Canada which was necessary in view of the finding of nests of the Brown-tail Moth in shipments of nursery stock from France, is treated of fully in the annual report of the Division of Entomology and Botany for 1908-1909, which is now in press.

A short statement, however, of the work which was done in the provinces of Ontario and Quebec may be of interest to the members of the Society attending this meeting.

Nests of the Brown-tail Moth containing living larvæ were discovered early last January in New York State on apple, pear and cherry seedlings and quince stocks imported from France. This fact was at once communicated to the Division of Entomology, and a circular giving this information and asking for advice of shipments coming into Canada was at once prepared by the Director, Dr. W. Saunders, and sent out to nurserymen and others who would be interested, as well as to the press generally. On February 5th, after undoubted nests had been found in Ontario, a second circular, giving further information on this threatened invasion of such an injurious insect, was prepared by the Director and the writer, and sent to nurserymen.

The first nest found in such imported nursery stock in Ontario was on a plum seedling on 27th January. This was in the first shipment of stock examined. From this date until May 20th, every shipment of nursery stock coming into the provinces of Ontario and Quebec was examined carefully, either by me or by Mr. Harry Arnold, the Provincial San José Scale Inspector, of Pelham Centre, who had been instructed by Mr. P. W. Hodgetts to assist me on certain dates in this work. Every nurseryman who imported such stock was visited, as well as a number of seedsmen and florists. Thirty different firms or individuals in all were visited, 26 in the Province of Ontario and 4 in the Province of Quebec. A complete list of these and the nature of the stock examined and the number of nests found will be found in the report of the Division above referred to. Many of the nurserymen had to be visited several times, immediately on the arrival of stock.

The examination of this imported stock had, of course, to be made very carefully. Generally speaking, the whitish nests were easily detected, but occasionally small nests would be found, or some which had become broken. The nests mostly occurred between two or three of the twigs or along the main stem of the seedlings, and in size varied from less than half an inch in length and about the same in width, to about nearly three inches in length and over an inch in width.

In the provinces of Ontario and Quebec, 1,503,129 plants were examined. These consisted largely of apple, pear, plum and cherry seedlings, to be used either for grafting or budding. In the province of Ontario, 188 nests of the Brown-tail Moth were found, and in the province of Quebec, 8, making a total of 196. These were found as follows: 100 on pear, 56 on apple, 28 on plum, 5 on quince, 1 on cherry, 2 on rose, 2 on spiræa, 1 on sugar maple and 1 on Prunus pissardi.

We have reason to expect, owing to the way in which the consignments of nursery stock were examined, that every nest of the Brown-tail Moth present was found. No report has come to the Division since this inspection work, of any larvæ of the Brown-tail Moth having escaped from these shipments and established themselves. Nurserymen and others were strongly advised to burn all packing, etc.,

in the cases in which the nursery stock was shipped, as well as the cases. After the trimmings from the fruit seedlings had been burned, as an extra precaution the importers were advised to dip the stock in kerosene emulsion, or a standard miscible oil as was being done in New York State. If the packing, etc., from these cases were not destroyed before spring, it can be readily seen how some of these caterpillars might have got out and established themselves.

In the report of the Division now in press there will also be found a statement of some experiments with hydrocyanic acid gas to kill the larvæ of the Brown-tail Moth. These experiments were conducted in a fumigation box having 128 cubic feet of contents. Varying strengths of gas were tried, from the one used in the federal fumigation houses to destroy the San José Scale, viz., 1 ounce of cyanide of potassium, 1 ounce of sulphuric acid and 3 ounces of water to every 100 cubic feet of air space, exposure 45 minutes, to three times this strength, the exposure being lengthened to 2 hours. In these experiments many of the larvæ had left the nests and were active on the sides of the glass jars, with cheese cloth coverings, in which they had been kept. These experiments, although not very extensive, went to show that fumigation with hydrocyanic acid gas evidently cannot be relied upon as a practical remedy for this insect when in its winter condition. Even when the strength of the gas was three times that used in our federal fumigation houses, and the exposure very much lengthened, only a very small percentage of the larvæ which had left the nests were killed. It would certainly require considerably greater strength and much longer exposure to kill the larvæ when within the nests, and owing to the tough, closely woven nature of these nests the outcome would be very doubtful. In this work of fumigation I was assisted by Mr. Herbert Groh.

THE LARGE LARCH SAWFLY.

(*Nematus Erichsonii, Hartig.*)

Dr. C. Gordon Hewitt, Dominion Entomologist, gave a brief description of his work on this insect in England, where it is becoming a serious forest pest. Its distribution in Canada is also increasing and the larches (*Larix americana*) as far west as Winnipeg, are now suffering from the attacks of this sawfly, which destroyed most of the larches in Eastern Canada subsequent to its appearance in 1882.

Only one brood was found to occur—the deposition of the eggs and the emergence of the larvae extended over a considerable period, and might give the impression that the species was double brooded.

The chief parasite was found to be *Mesoleius aulicus,* Grav., and investigation showed that in 1908 the average number of cocoons parasitised was 6 per cent., in the present year it was found to have doubled. Another ichneumon, *Microcryptus labralis,* Grav., was bred out and this insect is probably a hyper-parasite on (*M. aulicus.*)

One of the most potent factors in the natural control of the insect was the Field Vole (*Microtus agrestis,*) which extracted the larvæ from the cocoons during the winter, during which season the larvae form a large portion of their food. In one plantation about 50 per cent. of the cocoons were emptied in 1908 by these rodents.

Certain species of birds, such as the starling, rook, jackdaw and tits were of great importance in destroying the larvæ in large numbers. A scheme of attracting these species of insectivorous birds by means of nest-boxes was initiated and the results of the experiment were very gratifying, 33 per cent. of the boxes being utilized in the first year.

A species of *Cordiceps,* a fungous parasite, was found to be destroying a large number of the pupating larvae, and as the probable method of infection is terrestrial, this fungus may prove to be an important means of natural control.

The eradicative measures which were carried on against the larvae on the young trees were spraying with lead arsenate and crushing the larvae when they are in the "clustering" stage of their life-history, both of which measures were very effective in preserving the foliage of the trees under 8 feet high. Such measures of course cannot be employed in the case of large tracts of young self-sown larches, such as occur in many places in Canada; in such places natural means of control must be relied on.

NURSERY WORK IN ONTARIO.

By R. C. Treherne, Grimsby.

It is with a great deal of pleasure that I am enabled to give you a report on the Nursery work in Ontario. This year the Ontario Government, for the first time since 1902, instituted a general summer inspection of the nursery stock of Ontario, with a view to more effectually check the increase, distribution and ravages of the San José Scale and other pernicious insects which are prevalent in the nurseries, and also to gain a more precise idea of the nature of these attacks and the extent of their prevalence. A report, such as I am attempting to present to you at the present time, must necessarily be of a somewhat general character for the reason that the work is not yet finished and the final report is not yet completed. Nevertheless I will endeavour to outline to you the course adopted by the Government, which ultimately led to the formation of this summer inspection. The inspection is principally aimed at the San José Scale, but other insects, fungi and plant diseases are also included.

For the last three years sub-inspectors were appointed in the Niagara Peninsula where the bulk of the nursery stock is grown, and to quote from last year's report, "It was the duty of these men to watch closely to see that all nursery stock was properly fumigated before being shipped out, and also to report any instances of scale being found in the nurseries." Presumably the work of these inspectors was sufficient to show that the scale had become localized in many nurseries, and, in order to effectually combat the insect and prevent its spread it was expedient to discover its breeding places and distributing centres. With that view, then, the course of summer inspection of all nurseries was adopted; the Act which had already been passed prohibiting the sale of scale-infected stock was enforced, and inspectors were authorized to break down, or otherwise prevent from sale, affected stock in the nursery row.

The work was started in the Niagara District early in August of this year with two, and sometimes three, inspectors employed. They commenced at Stoney Creek and worked through to Queenston and at the present time (Nov. 4), are engaged in the Welland and Fonthill Districts.

The work has been delayed somewhat owing to the enormous amount of stock that is being grown and is ready for sale at the present time. According to last year's Fruit Branch Report, there were well over two million fruit trees growing in the nursery rows, to say nothing of grape and small fruit cuttings and the various ornamental shrubs that are being propagated. This year, I believe, the amount is still larger when all saleable stock is computed.

It is the duty of the inspectors to make a tree to tree inspection, locate the scale and dig up and destroy affected plants; and since a single man can only examine 15,000 to 20,000 trees a day, according to the nature of the stock and the care it has received, it can be imagined that the work is assuming great proportions. But it is work along the right line, and the nurserymen realize this.

Here it might be desirable to lay greater stress on the work of the local inspectors, whose duty it is to examine and enforce the law on those orchards found to be infested by scale throughout the country, but specially in the neighborhood of nurseries. For it is only by destroying the root of an evil that we can hope to accomplish results, and so long as infested orchards remain, just so long will the scale be found in the nursery.

From observation this summer it appears that the orchardist in very many cases neglects his duty to the Peninsula, and that the nurseryman in nearly every case is anxious to reduce the scale to a minus quantity.

Speaking generally, the San José Scale has been found in nearly all the nurseries thus far examined, and is found to be present in greater or less quantities, varying from one tree to several hundred, dependent on the locality. But little scale was found in the nurseries of the Stoney Creek District, but a considerable amount was found in the old Niagara District. A varying quantity was found between these two districts with a gradual tendency to increase from the former towards the latter. Scale is also very prevalent in the Fonthill District—greater infestation being to the north and north-west of the village.

Birds, and the procuring of scaly bud-sticks appear to be the principal means of the distribution within the nursery, while shipment after faulty fumigation seems to increase the area of infestation outside. It is peculiar that sometimes a three year old tree literally encrusted from the twigs to the ground, will be the only tree in a row affected, thus proving the necessity of a tree to tree inspection.

Remedial measures most commonly in use in the nursery are the Lime Sulphur Spray, Whale Oil Wash and the Carlson Mixture.

Besides the San José Scale, there is a long list of insects found on nursery stock. The most important, the most frequent and the most evenly distributed being Pear-Tree Slug, Leaf-Hopper, Red Spider, Oyster-shell Bark Louse, Blister Mite, Woolly Aphis, Bucculatrix, and the Trumpet Leaf-Miner.

From the botanical standpoint, the Cherry Mildew, Black Rot of Grape, Fire Blight, Bear Scab, Black Knot, Crown Gall and Hairy Root, are the most frequently observed fungous diseases.

It is hoped that future years will see this scheme of summer inspection continued. A fuller and more complete account of this year's work will probably be published in the Report of the Fruit Branch, Department of Agriculture.

During the discussion that followed, attention was drawn to Clause 2 of the Nursery Inspection Act, which states that:

"The Council of any city, town, township, or incorporated village may, and upon the petition of 15 or more ratepayers shall, by by-law, appoint at least one inspector to enforce the provisions of this Act in the municipality."

It was considered that there is a weakness in the clause which authorizes a Council to appoint an inspector, chiefly because the local man, from the very fact that he is a local man, does not inspire confidence. The fruit-growers and farmers with whom, in the performance of his duty, he comes in contact, ask one another the questions: "What does he know about the scale?" "Does he know the scale better than we do?" And further, the local inspector does not wish to risk disputes and wrangles and loss of his popularity by condemning a neighbor's orchard. On this account it would seem better to appoint as inspectors outside men, and that the Government should assume entire control of the work.

The following resolution was then unanimously adopted:

Moved by Dr. C. Gordon Hewitt, Dominion Entomologist, seconded by Mr. A. F. Winn (Province of Quebec), "that this Society, having heard from Mr. Treherne an account of the methods and work being done by the inspectors, wishes to express its great appreciation of the Ontario Government's arrangements for the inspection of nursery stock this season, and hopes that this important work will be continued with equal, or even greater, zeal in the future."

SOME GUESTS AT THE BANQUET OF BLOSSOMS.

By F. J. A. Morris, Trinity College School, Port Hope.

In 1905, my first season of collecting, I went over to England at the end of June on a botany trip. I had already begun to watch for beetles on blossoms before leaving Canada, though my chief hunting ground had been the bark of trees. In England I knew that the latter game-preserve was practically out of the question, as timber is far more scarce, and nearly all the woods are kept too clean for fallen timber to lie or wood to rot. If I meant to do any beetle-hunting, it must be by some other method, and I naturally made up my mind to combine hobbies by carrying a collecting-bottle out with me on my daily botanical rounds.

My first stay was on a small estate in Chislehurst, Kent. Here, in this garden within a garden, while wandering through a wood of hazel and oak, I came on a large clump of tall umbellifers in full bloom. I knew already from Fowler's and other books that such blossoms were a favourite haunt of certain beetles, and I made my way cautiously along a hedge of rhododendrons towards the clump. As I did so, there rose from between my feet a dark brown hawk-like bird, that flew up into my face and hovered for some moments in front of me; it was a nightjar, the famous goat-sucker of popular superstition, menacing, but powerless to fulfil a threat, being, indeed, cousin-german to our night-hawk and whip-poor-will, with all the furtive movements and ghostly silence of the creatures that fly abroad by night and hawk beneath the light of the moon. Like the nighthawk, it builds no nest, but there among the round flint pebbles by an oak lay its pair of eggs.

When first I got to the clump of flowering plants and scanned their broad white discs of blossom, among numerous diptera and hymenoptera, nothing was to be seen except a few butterflies, but presently I saw a large black and yellow Longicorn settle on an umbel some distance off. On approaching I found two of the beetles feeding and succeeded in catching one in my hand. They were very active, as quick as sunflies and almost as wary, so that capture was far from easy. I managed, however, to get a second specimen some time after. They proved to

be Strangalia armata; later on in the season I captured in North Wales a pair of Strangalia melanura, one on a composite, the other on a small umbellifer; and in Somerset, on the slopes of the Quantocks, I captured the more rare Strangalia quadrifasciata, sunning itself on a hazel leaf. The genus Strangalia is closely related to Leptura, and, like that genus, with its near allies frequents blossoms. So far I have not found any in Canada, though some species are, I believe, not uncommon. From the wood I passed into the kitchen garden, for I remembered a bed of orpine or livelong (Sedum telephium) where, 25 years ago, I could be sure of some Red Admirals (Pyrameis atalanta) and an occasional Peacock (Vanessa io), but alas! King Orpine's days were numbered, and Salpiglossis and Montbretia reigned in his stead. However, I spied a bed of asparagus and went over to review its ranks. I soon found that ladybirds were glutting themselves on a small dark grub about the foliage; it was probably the grub of the asparagus beetle (Crioceris asparagi), for I found a number of the mature insects on the leaves. Though very small, this beetle is extremely beautiful when alive, the vertical lines and cross-bars which appear black in cabinet specimens being of a rich dark green in the living insect. It has a curious habit when alarmed of thrusting its antennæ straight forward in front of the head and remaining motionless like a pointer; this habit is found in not a few of the Chrysomelians, as in some of the Longicorns, notably the Saperdas. I saw no trace of the 12-spotted species (*Crioceris 12-punctata;* indeed, at the time I did not know it occurred in Great Britain; but in September, 1907, I found both species on some asparagus in the late Dr. Brodie's garden in Toronto, and the last two years I have found the latter species abundant in Port Hope. In Dr. Bethune's day, I understand, it had not yet appeared there.

During the rest of my stay in England I did not do much collecting, as the month of August forms a sort of interregnum in insect activity between the early and the late broods. But I returned to Canada fully determined to prosecute my search among flowers and foliage in the coming season. I knew, of course, that I should thereby restrict my captures mostly to two or three families of beetles —the Scarabs, Longicorns and Chrysomelians, but to some such form of amateur specialism I was not at all averse.

Accordingly, from early April in the spring of 1906, I was out and about whenever I got the chance. It was not till May that my efforts met with much reward. A species of Œdemeris that frequents the dogtooth violet was almost the only capture. I had been told that a somewhat rare Longicorn was to be met with on the blossom of the trillium, but my informant could not tell me its name, nor did patient search in trilliums yield me any specimens of this family. About the 20th of May, however, blossomed the early elder, and though I wasted a great deal of time over elder clumps growing far away from woodlands, I did at last, by good luck, direct my steps to some growing on the edge of a wood about four miles north of the school. Here I found a new species of Scarab, leaden-gray in colour, though disguised for the nonce in a light yellow coat of pollen, with which it was thickly dusted over; it had long crooked hind legs that looked too clumsy to be of much use to their owner, and were, indeed, trailed along after it when it crawled. It was the male of *Hoplia trifasciata,* and I found it abundant for two or three weeks on the early elder, the choke-cherry, and the hawthorn; at first only the males were to be found, but about a week later the females became common; these at first I took for a distinct species, as they are very different in colour, yellowish-white, with three irregular bands of brown across

the back; on the hawthorn, however, where the female was in preponderance, I more than once found a pair. The same mistake appears to have made its way into print, and the two sexes were at one time assigned to distinct species, the male figuring as *Hoplia tristis,* and the female as *Hoplia trifasciata.* I found also on this clump of elder a few specimens of one of our earliest Lepturas, *L. ruficollis;* and, by way of a new illustration to the old adage that "it never rains but it pours," three specimens of what at first I took to be an ant, till on looking closer I saw the straight line down the back formed by the suture of the wing-covers and the gracefully curving antennæ that mark the Longicorn beetle. It was quite new to me, and my fellow-collector, though several seasons older than I, had nothing like it in his collection. There was nothing specially remarkable about its colour, which was blackish or dark gray, relieved by some transverse pencilled lines of white, and it was only 1-3 of an inch in length, but there was an elegance of form and outline that made it long a favourite in my little collection. This enthusiasm in a grown man doubtless seems absurd to the uninitiated, and I must admit, somewhat ruefully, that I found myself an object of pity rather than envy when I "talked beetles" to a brother of mine who has misspent the last 20 years of his life tiger-hunting in Madras and bagging lions in Rhodesia, in fact, generally making ducks and drakes of all his golden opportunities to collect rare Longicorns from tropical blossoms.

In the identification of this insect occurred an episode that I hope Dr. Bethune will pardon me for introducing here. At the close of this season of 1906 I purchased a copy of LeConte & Horn's key to the genera of N. A. Coleoptera. By a somewhat rough process of elimination I had decided my beetle belonged somewhere in the tribe *Clytini,* whose most familiar representative is probably the famous sugar-maple borer, *Plagionotus speciosus.* LeConte & Horn's book made it probable that in the third group of this tribe, the *Anaglypti,* it would find its place. This group contains four genera, *Microclytus, Cyrtophorus, Tillomorpha,* and *Euderces.* Only one of these genera was at all known to me, and that from a single species (*Euderces picipes*) somewhat resembling the subject of my examination. I found first of all that the beetle I was trying to place had no ivory marks on the elytra, which put *Euderces* out of the question; the eyes were oblique and emarginate instead of round, which excluded *Tillomorpha;* it must be either *Microclytus or Cyrtophorus,* and the book gave one no choice, for in *Microclytus* the second joint of the antennæ was equal to the fourth, while in *Cyrtophorus* the second joint was much shorter, as it obviously was in my specimens. My fellow-collector had already sent a box of unidentified specimens to Guelph to be named, and when they came back I was naturally eager to learn the result. To my chagrin I found my little favourite christened *Microclytus gazellula.* This so mystified me that at last I wrote to Dr. Bethune, explaining the quandary I was in. To my great relief I got an immediate reply, that the beetle sent him had been identified from a cabinet specimen named by an older collector. LeConte & Horn were right, my beetle was *Cyrtophorus verrucosus,* as were those in the Guelph cabinet, though hitherto wrongly named.

I have examined a number of cabinets, and in none of them yet have I found more than an odd specimen of this beetle, nor have I met a Coleopterist who had captured it, except accidentally, as it were. But on the blossoms of the early elder, still more those of hawthorn, sometimes of choke-cherry, dogwood, spiked maple, viburnum and New Jersey tea, from the middle of May till early in July, I have found it abundant. It is then replaced by its near relation, *Euderces picipes,*

which frequents blossoms all July, especially those of New Jersey tea and milkweed, though often met with also on certain of the Rosaseæ and composites. It closely resembles *Cyrtophorus,* though considerably smaller and not so elegant in form; on the side of each elytron is a transverse white band, technically termed an ivory vitta; in the first specimens captured I did not recognize a new kind till I took them out of the killing-bottle.

This finding of a new species acts as a great incentive to the collector, not merely through the stimulus and encouragement of filling gaps in his cabinet, but through the interest and education of comparing closely-allied species and genera, and gradually following out the relationship of distinct tribes as the series of intermediate forms grows more and more continuous; thus retracing, as it were, the steps of natural evolution. It was, I know, a great encouragement to me to find the wide gap between, say, the Cyllenes and the Lepturas being gradually filled in and the various stages of the transition emerging, so to say, from the unknown. I believe it was the consequent redoubled efforts made by my fellow-collector and myself the next season, more than mere luck, that brought us an interesting discovery in the middle of June. On a certain Sunday morning I captured on spiked maple a specimen of an ant-like beetle, obviously belonging to the *Anaglypti* group, but neither *Cyrtophorus verrucosus* nor *Euderces picipes,* and in the afternoon of the same day on hawthorn, my friend captured a specimen of an ant-like beetle neither *Cyrtophorus verrucosus* nor *Euderces picipes.* Neither of us noticed his discovery till we came to turn out the contents of our killing-bottles on returning home. Stranger still, the new species we had captured, when we came to compare notes, proved different from one another. By a close examination of my friend's capture, I found he had at last got a genuine specimen of *Microclytus gazellula.* My capture has not yet been identified, but it may be referred almost certainly to the genus *Cyrtophorus.*

I have been led into something of a digression here, and for purposes of this paper I may remind you that we are in the month of May, and searching for beetle guests on the blossoms of the early elder. Through the middle of the wood where I made these first discoveries flows a small stream that has eaten out for itself quite a deep ravine through the limestone, clay and marl. About 100 yards up this glen grows a large shrub of early elder that opens about the end of May; on its blossoms we got several more of the *Leptura ruficollis,* but nothing new that season. In 1907, however, while my fellow-collector was examining the blossoms, he spied a new Longicorn, of which he captured three specimens, and a day or two later, from the same shrub, I managed to get two. Though there were several other elder bushes in the wood, we have found this beetle on none of them, only on this one tree, and it has yielded us from 3 to 5 specimens every season since. As far as our experience goes the beetle is active from the end of May till nearly the end of June. In 1907, from another locality I took two specimens on dogwood blossom; in 1908 I got three or four specimens on dogwood and on the thimble-berry, and in the season just over we both saw specimens feeding on hawthorn blossoms. It is the *Pachyta monticola,* a very pretty insect with pale yellow elytra, boldly marked with black or deep crimson. This genus is closely related to the Lepturas, but broader across the base of the elytra, and thicker through the sternum; its thorax, too, instead of being rounded at the sides, is armed with an excrescence known to Coleopterists as a "process." In 1907 and 1908 I succeeded in capturing a few specimens of two more species of *Pachyta,* smaller than *monticola,* and inconspicuous in colour, black, or black with dark

brown streaks on the wing-covers. They were taken late in June, feeding on the blossom of dogwood. And with every fresh discovery I swelled with pride as I found myself getting more and more intimate with this royal family among beetles, the Longicorns.

With the passing of May the early elder came to an end, but before it was over the hawthorns began to bloom all over the neighbourhood. Our first field of investigation *was* a field, an extensive pasture bordered on one side by a wood of pine, beech and maple. At first I went all about the farther end of the field wherever the snowy mass of hawthorn bush in full bloom drew me, but I soon found that it was only near the wood that my search was rewarded; the first captures were a couple of Scarabs called *Trichius piger,* a beetle looking very much like a small bumblebee and extremely active; it is abundant on blossoms from early in June till the middle of July, and may be found on a great variety of flowers. Then I got my first specimen of *Dichelonycha elongata,* another Scarab, which is particularly fond of basswood foliage, and becomes some seasons a veritable plague. Finally I came to hawthorns on the border of the wood, and here I found several Longicorns feeding. Among them three Lepturas that were new to me, *Leptura pubera, L. mutabilis* and *L. vibex,* of the last two only a single specimen. About the same date I paid a visit to the wood four miles away, to see what guests the hawthorns there were entertaining. On one bush at the edge of the wood I found both sexes of *Hoplia trifasciata* plentiful, two or three specimens of *Dichelonycha,* and a lot of *Leptura ruficollis* and *Cyrtophorus verrucosus;* and besides these a new insect that at first I passed over for a fly, till the long antennæ betrayed it; these in the female were about the length of the body, in the male twice as long; it was the more easily mistaken for a fly in that its wing-covers were reduced to a mere pair of epaulets or shoulder pads. It proved to be the Longicorn *Molorchus bimaculatus,* and was very abundant throughout June on several sorts of blossom. On another bush at the edge of the wood I found a regular colony of Chrysomelians busy in the blossoms. I sent three of these to Guelph, where they were identified as varieties of *Orsodacna atra:* in June, 1907, I found the same beetle on hawthorn blossom at Lakefield, and I have taken it also on viburnum; in no case did I find the normal form of *O. atra,* though a few of my specimens approximated very closely to it.

A curious feature about the hawthorn and its guests is that some shrubs apparently as favourably situated as others and in full bloom, were deserted and others crowded. It may prove that some species attract beetles and others do not; Gray's New Manual enumerates 65 species of hawthorn in N. A., while in Sargent's Monograph on the Cratægus in some parts of Ontario alone (as published in last year's Wellington F. N. Bulletin), no less than 95 species are distinguished. The results of closer determination in the species of plant hosts might prove interesting.

An encouraging thing about this sort of collecting is that seasons vary in the maturing of both hosts and guests, so that often you will find species frequenting blossoms that the year before they did not visit, and sometimes you will come across an entirely new insect. Two seasons ago, for instance, early in June, we found a strange beetle abundant on dogwood; it proved to be *Callimoxys,* a first cousin of *Molorchus;* in this genus the wing-covers are not short as in *Molorchus,* but awl shaped, so that the inner margins do not lie together in a straight line. Again this last season I made a new find on hawthorn in the shape of a small oak-pruner (*Elaphidion*). Much, too, may result from search in a new neighbourhood;

in 1906 I found scores of *Lebia furcacta* (a small Carab of the Bombardier group) feeding on golden-rod about the margin of a swamp at Lanark, and last July I captured two fine specimens of the large blister beetle, *Pomphopœa Saya,* in Muskoka, upon nannyberry (*Viburnum lentago*).

When the hawthorn began to bloom in 1907, I went eagerly back to work my claims, for the bloom of a hawthorn last barely a week, and seems to attract insects for only a day or two. I had already ruled out the shrubs growing in the open; so I went first to the edge of the wood, but this faced west, and was exposed to a chilly wind. There was nothing to be found, and I followed the gleam of hawthorn north across some stump lands to a large wood; skirting its west and north border, I came presently to a stretch of low swampy ground that penetrated the wood in a southerly direction, and was entirely out of the wind. It was thickly grown with dogwood and spiked maple, both of which were in the prime of their bloom, and in full sunshine. The number of insects feeding on the blossoms was astonishing; in an hour or two I must have captured several hundred beetles. Besides *L. ruficollis* (with its variety *sphœricollis*), *L. vibex* was plentiful and so was *L. mutabilis,* whose name now for the first time became clear to me, both forms being abundant, the light brown and the dark gray; I found also a very small *Leptura* that was new to me (*L. subargentata*), and the beetle, *Encyclops cœrulea;* there were also a few specimens of *C. verrucosus,* and it was then that I got my unidentified species of *Cyrtophorus.* There were, of course, other families of beetles; in particular, Elaters, of which I captured four new species, one of which I have never seen except on spiked maple, the head and thorax dark brown, ending in a reddish-brown base, the elytra yellow-green, tipped with dark brown. On the same blossom in another locality I have taken three more Elaters, *Corymbites hieroglyphicus, C. propola,* and a third species not yet identified, prettily marked with dark wavy lines across the wing-covers; besides these, yet another Leptura (*L. 6-maculata*). *L. vibex* seems fairly to revel in these moist woody hollows, and later on in the same place on black elder I found *L. lineola* abundant. It is evidently addicted to black elder, and partial to moist woodlands.

As June drew to its close we extended our search to the south slope of a long ridge of high land, some 6 miles north of P. H. On this slope grew the New Jersey tea, and as there were many groves of standing timber, as well as berry patches and thickets of small trees and shrubs, we felt confident that we should make some finds. Our first visit to this place (which we dubbed "the Rocky Mountains") found the New Jersey tea still some days short of blossoming, but there was dogwood in bloom on the slopes, and almost the first bush we visited brought us three or four new beetles, among them *Gaurotes cyanipennis,* of the Lepturoid group, a stout, robust beetle, resembling in form *Pachyta monticola,* very handsome and of a brilliant dark green hue, and *L. capitata,* a beetle we at first took for *ruficollis,* but more tapering in outline, and with head crimson as well as thorax.

With the first days of July, along the southern slope of our local Rocky Mountains the New Jersey tea and late elder expanded to the sun, and the whole hillside became a revel of insect life. The delicate fragrance of the New Jersey tea would no doubt at any time attract guests to its dainty white clusters, but coming, as its blossoms do, jump with the height of insect activity, and in the most glorious weather of the year, the sun blazing through a breathless atmosphere, the number and variety of guests swarming to the feast were almost beyond belief. Some-

times an altercation would arise, when some blundering glutton (like *Bombus* or *Trichius*) tried to elbow his way into a blossom where there was no longer standing room. But "with them," as Wordsworth points out, "no strife can last."

> "For why?—because the good old rule
> Sufficeth them—the ancient plan
> That they should get who have the power
> And they should keep who can,"

—and the weakest go to the wall.

Among the many new species we met with in these happy hunting-grounds were several members of the group *Clyti,* between the *Cyllenes* and the *Anaglypti;* of this group we found an occasional specimen of *Xylotrechus colonus,* and a small *Neoclytus,* while *Clytanthus ruricola* was abundant. In the Lepturoid group we took many specimens of a genus we had not found at all before, *Typocerus,* of which we met with three distinct species, one black (*T. lugubris*), one black and yellow, banded like a wasp (*T. sparsus*), and a third mottled with patches of straw-colour and reddish brown (*T. velutinus*).

In midsummer heat, insects seem to grow nervously alert and restless and we found the Typocerus often defied capture; they would hover at a blossom without settling, like miniature humming birds, their tiny wings fanning with marvellous velocity, while their flight from one point to another was of the swiftest. A small beetle in flight is never conspicuous, and some of them when they settle on a blossom seem to have stepped out of the infinite, and when they take to flight again they pass away into a 4th dimension, as though, like Wordsworth's skylark, they too enjoyed a "privacy of glorious light," but one that needed no soaring to gain. More than once we found with birds of this feather that one in the hand was by no means worth two in the bush; there proved many a slip between the cup of one's closed fist and the lip of the cyanide bottle.

To the Lepturas themselves, already a long list, we added *L. subhamata, zebra, vagans, proxima, biforis, vittata, Canadensis,* and three species at least unidentified. Of these, *proxima* and *subhamata* seem to prefer the elder, and *Canadensis* the milkweed. In the same neighbourhood, from the heart of a dogrose I flushed an *Oberea bimaculata,* and from plants of the wild bergamot, with its sweet fragrance and delicate lavender blossoms, a whole covey of some smaller *Oberea* that I have not yet identified. I say "flushed" advisedly, for in the first instance I did not bag my bird; indeed, I chased it for two years before I caught it (the species, that is, not the individual). It is a small insect, of very narrow outline and black in colour; when flying it is almost invisible, only the practised eye can make out a minute and swiftly-moving shadow. You will get some idea of the hunter's difficulties when I say that I found it fatal to wink the eye while marking its flight; the creature simply disappeared like the skylark at the last point of vision. For one thing, it has a dodging flight, like that of a snipe, and to make its assurance of escape doubly sure it never settles on the upper side of a leaf, but always underneath. Even then it is seldom off its guard; if you cast so much as a shadow, it is off like a trout in a pool. I tell you there was rejoicing in the camp, if not feasting, when I came home with the scalp of *Oberea bimaculata* at my belt.

But in so fair a scene as the Port Hope "Rocky Mountains," disappointments cast but a passing shadow. The place was a perfect Paradise of flowers, and as we wandered in sunshine beneath the vaulted blue, over beds of New Jersey tea, through thickets of raspberry and thimbleberry, among brackens and orange lilies,

by fences festooned with grapevine and smothered in dogrose, everywhere a riot of blossom and insect life. Nature transfigured with the glory of the July sun, we thought of the wonderful interdependence of all living things on earth, and felt—I hope I may say it without irreverance—that it was good to be there.

" Such life there, through such lengths of hours,
Such miracles performed in play,
Such primal naked forms of flowers,
Such letting Nature have her way,
While Heaven looks from its towers!"

EVENING SESSION.—THURSDAY, NOVEMBER 4.

At 8 o'clock p.m., a public meeting was held in the Massey Hall auditorium, which was well filled with students, both male and female, and a number of visitors from the town as well as members of the Society. The chair was taken by Dr. Bethune, Professor of Entomology. The proceedings were much enlivened by musical selections excellently rendered by the College Orchestra under the direction of Mr. J. D. Tothill, fourth year student in Biology, and a piano solo by Mr. Roy Fraser, another student in the same department.

After a few remarks by the Chairman on the origin and progress of the Society which was celebrating its forty-sixth anniversary and the near approach of its jubilee, he introduced the speaker of the evening, Dr. C. Gordon Hewitt, the newly appointed Dominion Entomologist, who was taking up the work at the Experimental Farms so long and so ably conducted by their lamented friend, the late Dr. James Fletcher. It was a great pleasure to welcome Dr. Hewitt to Canada, and to have his kindly assistance during the proceedings of the annual meeting of the Entomological Society.

HOUSE-FLIES AND THEIR ALLIES.

Being the major portion of a lecture delivered before the Entomological Society of Ontario, on November 4th, 1909, by C. Gordon Hewitt, D.Sc., F.E.S., Dominion Entomologist, Ottawa.

It is an especial pleasure to me to have this opportunity which the Entomologists of Canada, in inviting me to give this address, have afforded me, of addressing my first remarks in public in Canada to the Entomological Society and the students of the Ontario Agricultural College and the Macdonald Institute. It is, in a sense, my official introduction to you, and the cordial reception which I have been accorded on all sides, and especially during the meeting, have been most encouraging, and I can only say in reply to it all that while I have the honour to be Dominion Entomologist it will be ever my object to further the science of entomology, especially Canadian entomology, and by the application of the results of scientific research to deal with those varied problems, both great and small, which confront the entomologist when dealing with injurious insects and their control.

The subject of my address this evening is one that is familiar to you all. In Canada I find you know the house-fly only too well. It is man's most constant com-

panion and the most truly "domestic" animal in the world. Wherever man has gone the house-fly has followed in his steps, from the arctic circle to the burning tropics it dances in constant attendance, the uninvited guest. And yet, in spite of all this, notwithstanding the fact that no living creature paid him so much attention, he did not trouble himself about it beyond a most cursory inquiry into its habits and life. This is not infrequently the case in zoological science; we write monographs of inordinate length on species of animals whose chief recommendation is that they are rare, whereas on the other hand, those animals, frequently of great interest and importance, that are waiting on the threshold of our laboratories for inquiry are passed over. The house-fly is one of the greatest examples of this. In 1790, Keller made an excellent study of the "Stubenfliege;" he studied the life-history and anatomy and anyone who has seen the beautiful memoir which he wrote and the charming illustrations will be filled with admiration and wonder that so much could have been done with the scientific apparatus then at the investigator's disposal. Previously and subsequently to that, those great naturalists, Reaumur, DeGeer and Bouche, all included a short description of this insect and its habits in their classic works. Since that time the only investigators who contributed really valuable information have been Packard and Howard, who have studied the life-history and habits in the United States. There is no need for me to call the attention of Canadian entomologists to the great importance of Dr. Howard's work, the value of which lies in the fact that he, above all investigators, showed the people of the United States, and of other countries too, the serious rôle which the house-fly plays in our national life. I need only refer to the excellent work which is being done by the New York Merchants' Association to combat this danger from flies—than which such an association could do no work more worthy—as an illustration of the manner in which a corporation has taken the warnings, has proved them beyond dispute for itself and is applying the results of such knowledge as it has gained to the amelioration of public life.

It has been my good fortune during the past few years to be able to add a little to our knowledge of this insect by a detailed study of its anatomy of which we had no previous account, and its life-history and habits. The result of that work has now been finished, though like most investigations it is not complete and it is my intention to-night to give you briefly and in a popular manner some of the results of my work and of the work of others who have been studying the habits of this insect.

First of all, you must understand that several species of flies inhabit houses, some of these are frequently mistaken for the true house-fly (*Musca domestica*). This species is easily recognizable by having on the dorsal side of the thorax four almost black longitudinal stripes on a dusty grey ground which in certain lights has a golden shimmer; the ground colour of the abdomen is a buff yellow and there is a dark brown median dorsal stripe; the whole of the dorsal side of the abdomen, however, is overspread with a reflecting grey which gives it a blotchy appearance. The average size of this species is 6-7 mm., but unfavourable conditions in the larval life tend to produce dwarf specimens of the adults. The occurrence of these smaller specimens was no doubt partially responsible for the popular idea that they were *young* house-flies and this in turn led to the mistake that many non-etomological people make in believing the other species of fly which occurs in houses, namely, *Homalomyia canicularis*, to be a young *M. domestica*. This lesser house-fly differs on examination very considerably from *M. domestica*. In the venation of the wings the fourth longitudinal vein of the wing of *H. canicularis* goes straight to the margin as in all the members of the group *Anthomyidæ*, whereas in *M. domestica*

it is bent up at an angle before reaching the margin which it joins close to the termination of the third longitudinal vein; not only is it smaller, but in form and colouration *H. canicularis* differs from *M. domestica.* The dorsal surface of the thorax of the male is greyish black with three indistinct longitudinal stripes, the male's abdomen is slender and tapering compared with that of *M. domestica;* it is bronze black with three or four pairs of translucent yellow lateral areas. The body of the female is coloured a dark ash-grey and the thoracic stripes are more distinct, the abdomen shorter and more robust.

Musca domestica forms by far the major portion of the fly population. Howard's, Hamer's and my own observations show that the percentage is usually 90-98 per cent. of the total fly population.

Another fly that sometimes occurs in houses, especially country houses in the fall, and also in the spring in England, and whose habits have frequently led to the popular erroneous idea as to the ability of the house-flies to bite, is the blood-sucking *Stomoxys calcitrans,* known by various popular names such as Storm-fly, Stable-fly, Fall-fly, all of which names are equally inapplicable to one species. It can readily be distinguished from *M. domestica* by the sharp awl-like piercing proboscis which projects forward horizontally from beneath the head. This type of proboscis enables it to pierce the skin of animals and thereby suck the blood of the same. It is interesting to note in passing that *S. calcitrans* is allied to those tropical blood-sucking Diptera of the different species of Glossinas, which are responsible for the deadly disease of sleeping sickness and Nagana. They carry the Trypanosomes, the organisms which cause the diseases, and by their blood-sucking habits infect man and other animals. The former disease has reduced in a few years the population of Uganda by two-thirds and Nagana has rendered central and sub-tropical Africa practically impassable to horses.

Musca domestica possesses a proboscis that is quite incapable of piercing the skin. It is only of use in absorbing fluids and this process of absorption is one of great interest. The proboscis is extended in the following manner. The vacant spaces in the head are filled with capacious air-sacs and blood; by the inflation of these air-sacs of the head the blood is driven into the cavity of the proboscis which is thereby extended and the two lobes which form the oral disc are distended by means of the blood. These oral lobes are traversed on their inner sides by a very large number of channels which are kept open by minute rings open at one side—and owing to their tracheal appearance are called pseudotracheæ. The oral surface is applied to the fluid-moistened surface and by capillary action and the pulsating movement of the oral lobes the fluid runs along the pseudotracheæ into the oval pit and thence into the pumping pharynx—the pumping action of the latter keeping up the constant inward flow of the solution. In the case of such solid food as sugar this is first rendered soluble by the secretion of the lingual or salivary glands. The surface of the oral lobes is kept in a moist condition by the secretion of a small pair of labial glands.

If the abdomen of a mature female fly is opened it will be found that it is almost filled by the enormously distended ovaries; the alimentary tract occupying a small trough-like cavity between them and the dorsal region. In the posterior region of the abdomen the ovipositor will be seen usually in a retracted telescopic condition. When exserted the ovipositor is about equal in length to the abdomen and the female fly is thus enabled to deposit her eggs deep down out of the light in the crevices of whatever substance, decaying vegetable or excremental, it may have chosen as a nidus for the larvæ. About 120 to 150 eggs become mature at the same time and these are deposited in clumps, as many as sixty or seventy may

be found packed together in one clump. The eggs are pearly white in colour, marked with very fine sculpturing; they are 1 mm. in size, slender and cylindrically oval, one end being more pointed than the other and along the dorsal side of the egg there are two curved rib-like thickenings of the chorion. The eggs of *M. domestica* have not the appearance of the grooved wheat grain as stated by several writers. It has been found that horse manure is the special breeding place of flies, but they will deposit their eggs and the larvæ are able to feed on almost any kind of excremental products and in decaying vegetable substances such as kitchen refuse, especially if such substances are in a fermenting condition. They will also deposit their eggs in decaying fruit and certain food stuffs such as moistened bread, egg, broth, etc. The most important factor which governs the development of the larvæ is temperature; a high temperature accelerates the development. It is also affected by moisture, diminution in the amount of moisture retards development and by the character of the larval food and fermentation. The shortest time which I was able to obtain for the development of *M. domestica* was eight days. This was obtained by keeping the larvæ at a constant temperature of 35 degrees C., and the times occupied in the different stages were as follows:—egg from deposition to hatching, 8 hours; whole larval or "maggot" stage 5 days; the larvæ moult twice and the times occupied in the three larval stages were 24 hours, 24 hours and three days respectively; the pupal stage lasted three days. These times are probably as short as will be found usually under natural conditions. Under unfavourable conditions, with regard to temperature, moisture, etc., the development has been found to extend over several weeks. In no case, however, was it found possible to keep the insects in the pupal stage during the winter nor do I know of any other observer who was able to do so. They invariably pass the winter as adult flies, and under suitable conditions of temperature and the presence of larval food, are able to breed during the winter months. The newly hatched larva measures 2 mm. in length and the average length of the adult larva is 12 mm. It is a typical, conically cylindrical, muscid larva, or "maggot," consisting of thirteen segments. It progresses by means of seven pairs of locomotary pads on the ventral side of the body and these are covered with small spines. The intestine of the full-grown larva is very complicated as will be seen from the figure thrown on the screen. When the larva is full-grown it retracts the anterior and posterior ends to form a barrel-shaped pupal stage lasted three days. These times are probably as short as will be found from a creamy yellow to a dark chestnut brown. When the fully developed fly emerges from the pupal case it pushes off the front end of the case in two sections by means of an inflated sac in front of the head; this sac is afterwards withdrawn into the head. After emerging from the pupal case the fly crawls about until its wings have attained their permanent form and the body has hardened and dried. In my experiments I found that the flies became sexually mature in ten to fourteen days after their emergence from the pupal state, and four days after coitus with the male they began to lay their eggs which was possible therefore from fourteen days after emergence from the pupæ. It will be seen from actual observations and experiments that in hot weather the progeny of a fly may be laying eggs in about 3 weeks from the time the eggs from which they were hatched were deposited, and as a fly may deposit about six hatches of eggs in a single season, it is not difficult to realize the millions of flies which a few flies may produce in the hot summer months. These observations indicate two important points: first, the necessity of destroying the *first* flies that appear in the season, and secondly, the abolition of their breeding places. In our towns and cities owners of stables should be compelled to either remove collections of manure

within seven days or to treat the manure with such a substance as chloride of lime or mineral oil as each lot is thrown on the heap to prevent the breeding of the flies and such manure should be kept in a chamber to which flies cannot obtain access. The first method is the best and most effectual and certain cities have now by-laws enforcing such periodic removal of manure. All cities and towns should enforce such removal or treatment, nor should they allow the accumulation of rubbish and substances on which flies can breed as many local authorities are accustomed to do. It is invariably found in such cases that the maximum number of cases of zymotic diseases such as typhoid and epidemic diarrhœa are located around such places. The change of attitude of people towards house-flies during the last few years has been remarkable. Public opinion on such subjects is slow in changing and although we had known for years from the work of Celli, Nuttall, Hoffman and many others that flies were in the habit of carrying the bacilli which cause certain of our infectious diseases such as typhoid fever, ophthalmia, tuberculosis, etc., it was not until medical men as a whole began to realize the important rôle that house-flies play in the dissemination of these diseases that we really began to move. But now there are fortunately few who do not realize the danger of the house-fly. What could be more probable than the transference of disease-carrying bacilli by flies when they have access to the dejecta of incipient or carrier cases of typhoid on the one hand and food materials on the other. Several observers during recent campaigns and also in military camps in time of peace have observed flies frequenting the food in the mess tents and carrying on their bristle-covered legs the white disinfectant from the camp latrines. Such an observation is sufficient to convince the most obstinate sceptic as the relation that flies may have in the transference of disease germs. Take, for instance, the flies in unsanitary localities; they are accustomed to frequent every kind of filth in the way of kitchen refuse and excremental substances and to spend a portion of their time regaling their palates with the food stuffs in the houses, especially such articles of food as sugar and milk. It has been proved that milk to which flies have had access becomes seriously contaminated with and infected by the bacilli which the flies have obtained from filth of different kinds and milk is an excellent medium for the growth of bacilli, especially during warm and hot weather.

What are the methods, then, which we have of combating this most serious menace, for, to my mind, the fly problem in our cities is far more important than the mosquito problem towards the solution of which thousands of dollars are spent annually—and compared with which the suppression of the fly danger is indeed as simple. They are these. First, the abolition of their breeding places; the removal within seven days in the summer, of collections of horse manure, decaying and fermenting vegetable substances on which the flies can breed. The substitution of the more sanitary system of sewage disposal by water instead of the older and generally insanitary and dangerous methods of conservancy. The protection of collections of manure or kitchen refuse; keep the lid on the refuse chamber. Do not allow flies to have access to food, especially such foods as milk, sugar, etc., but, where flies occur, keep all such food covered with a muslin covering. Farmers and dairymen should not leave milk about exposed and accessible to flies. A man would not be willing that flies should have access to a glass of milk intended for his own consumption, and why should he leave milk exposed in pails in cow-sheds and similar places where the flies have a maximum opportunity of covering their legs and bodies with bacilli of all kinds, especially putrefactive bacilli. "Prevention is better than cure" is almost a truism, but the welfare of the future will depend almost entirely on that one word, Prevention. Nature is yielding up her

secrets one by one through the toil of men of science, and it is by the application of the knowledge thus gained that we shall be able to avoid that great rod of chastisement of Nature, disease, which is inflicted on those who disobey or transgress her unwritten laws.

And while we have these insects arrayed against us there are others allied to them which, by assisting in the maintenance of a balance in nature take up their position on our side. These are the Tachinid flies, many of which, to the casual observer, have a superficial resemblance to the house-fly. There are a very large number of species of Tachinidæ and considerable variation in size and structural characters. The larvæ of most of them are parasitic on lepidopterous larvæ, and in certain cases these parasites increase to so great an extent that they may suppress completely an exceptional increase of caterpillars. It is largely owing to these parasites and the Ichneumons that our vegetation is not completely eaten up by lepidopterous larvæ. The Tachinid maggot feeds inside the caterpillar and gradually destroys the tissues of the host. In some cases the maggot leaves the caterpillar before it pupates, in other cases the caterpillar pupates and the Tachinid maggot pupates inside the cocoon or pupal cell. Their life-histories are extremely diverse and this is frequently found to be the case in the life-histories of the members of a group of animals which has assumed parasitic habits, whether it be insects, crustacea or more lowly organisms. Parasitism induces profound changes in the life-history of animals, and we find great variations in so small, comparatively, a group as the Tachinidæ. Whereas some of the insects deposit their eggs upon the skin of the caterpillars, from which position on hatching the larvæ bore into the interior of the host; others deposit their eggs upon the leaves of the plant as, I believe, is the case in *Ugimyia sericaria,* Rond, which is the cause of the most serious "Ugi" disease of the Japanese silkworms. The caterpillars, on feeding on the leaves, take the eggs in biting off the portions of leaf to which they are attached, into their digestive tracts where the maggots emerge and bore through into the tissues of the body. A third class is exemplified by the species *Eupeleteria magnicornis,* Zett, which, as Townsend has shown, deposits living maggots not on the caterpillars, but upon the green shoots, leafribs, etc., on which caterpillars were present and usually on the silken thread spun by the caterpillar on its trail over the plant. It will be recognized that the first method is the one in which the maggot is least sure of success in entering the host, for it not infrequently happens that the caterpillar moults before the eggs of the Tachinid hatch and thus rids itself of the danger. So that although we may find Tachinids depositing their eggs freely upon caterpillars, it is unsafe to predict beneficial results. Howard, for example, mentions a case in which 226 moths and only four Tachinid flies were obtained from 235 caterpillars of the Gipsy Moth, upon each of which 1 to 33 Tachinid eggs had been observed. In another case, 252 caterpillars, all bearing Tachinid eggs, were reared and not a single fly emerged. These cases illustrate well the advantage to an insect larvæ of such a method of growth by the moulting of the old skin. Once inside the caterpillar the maggot bores its way into the body cavity or blood cavity and immediately attaches the breathing pores at the posterior end of its body to one of the breathing pores of spiracles of its host and thus obtains its air direct from the outside. In this position it remains during the whole of its larval life, until it is full grown. It moults twice and the old skins remain attached at the posterior end of the body as the maggot does not leave the spiracle of the caterpillar to which it has once attached itself, until it finally leaves it to pupate.

Allied to these insects are the Anthomyidæ, some of whose larvæ are the destructive root-maggots, which feed on the roots of many vegetables, such as cabbages,

radishes, onions, beans, etc. A few years ago I found, when studying the life-history of *Musca domestica,* that the flies of the root-maggot (*Anthomyia radicum,* Meigen), were especially fond of laying their eggs on horse manure in which the larvæ were reared. This fact may account frequently for the presence of root maggots on crops, as it has been found that fields heavily manured suffer more from the attacks of root maggots than those on which there is less manure or which have been manured some length of time. Such facts as these have to be borne in mind in cultivating infested areas.

These few cases of the economy of certain allied insects will illustrate to you the benefits and injuries that are the result of different modes of life of insects somewhat closely allied and show how the knowledge gained from a careful study of the life-histories and habits of life or bionomics can be applied to further the welfare of man.

At the close of Dr. Hewitt's lecture, which was illustrated by a number of beautiful lantern slides of the life stages of various species of flies and of their structural and anatomical details (Plate F, page 141), a hearty vote of thanks was given him. President Creelman, in proposing the vote, and Professor McCready, in seconding it, spoke in high terms of the excellence of the address and the gratification that all felt in the appointment of so well qualified a successor to the late Dr. Fletcher.

The chairman referred to the measures that had been put in operation for reducing the number of disease-bearing flies in the city of New York, and the encouraging diminution in the percentage of cases of sickness and death during the later months of summer, especially amongst children. The meeting was brought to a close with a musical performance by the orchestra and the singing of "God Save the King."

SECOND DAY'S SESSION—FRIDAY, NOVEMBER 5TH, 1909.

The President, Mr. Tennyson D. Jarvis, took the chair at 9.30 a.m., in the Biological lecture-room of the Ontario Agricultural College. There was a good attendance both morning and afternoon, including many of the students as well as members of the Society. The first order of the day was the reading of the reports of the Council, the Branches at Montreal and Toronto, and of the different officers of the Society. The Montreal Branch was represented by Mr. A. F. Winn, and Toronto by Mr. J. B. Williams. The report of the Delegate to the Royal Society was read by Mr. A. Gibson, of Ottawa. This was followed by the election of officers for the ensuing year, 1909-1910 (see page 6).

REPORT OF THE COUNCIL.

The Council of the Entomological Society of Ontario begs to present the report for the year 1908-09.

The forty-fifth annual meeting of the Society was held at the Ontario Agricultural College, Guelph, on the 5th and 6th of November, 1908. There was a very satisfactory attendance of members from a distance as well as those locally resident; a considerable number of the students of the College were also present.

The first afternoon was occupied with the reading of the reports of the Directors on the insects of note in their respective districts, and a conference was held on the chief insect pests of the season, which was participated in by many of those present. In the evening a public meeting was held in Massey Hall, and a popular lecture was delivered by Dr. E. P. Felt, of Albany, State Entomologist of New York, on "The Interpretation of Nature," illustrated by lantern pictures. A paper was also read by Prof. Lochhead, of the Macdonald College, St. Anne de Bellevue, P.Q., on "Entomology in the Graduate School of Agriculture at Cornell University."

The morning and afternoon of the second day were occupied with the reading of the reports of the various branches and officers of the Society. Papers were also read on a variety of subjects, both scientific and practical. All of these have been published in the annual volume. This volume, the "Thirty-ninth Annual Report to the Legislature of Ontario," was published in March last, and contained 152 pages and 18 half-tone plates of gall insects, also a portrait of the late Dr. James Fletcher. The papers were further illustrated by over 40 figures in the text. Besides those already mentioned, it included the following articles: "What Entomology the Farmer and Fruitgrower should know," "The Strawberry Weevil," and "Injurious Insects of Quebec in 1908," by Prof. Lochhead; "A Catalogue of the Gall Insects of Ontario," "Apparatus for Collecting small Arthropods," and "Notes on the Coccidæ of Ontario," by Mr. T. D. Jarvis, President of the Society. Among the popular papers were, "Beetle Haunts," by F. J. A. Morris; "A Farmer's Wood Lot," by Dr. Fyles; "The Importation of Parasites of the Gypsy and Brown-tail Moths," by Dr. L. O. Howard, Chief of the Bureau of Entomology, Washington. The remaining papers were of a more or less scientific character, viz: "Hydrœcia Micacea in Canada," and "The Entomological Record," by Mr. Arthur Gibson; "The Life History of Euchætias Oregonensis," by Mr. H. H. Lyman; "Observations on the Sorghum Midge," by Mr. R. C. Treherne; "Enemies of Ontario Coccidæ," by Mr. A. Eastham; "Two Butterflies added to the Montreal List," by Mr. A. F. Winn; "Collecting with a Lantern Trap," and "Notes on Lachnosternas," by Mr. J. D. Evans; "The Tussock Moth in Toronto," by Mr. P. Hahn; "The Economic Importance and Food Habits of American Gall Midges," by Dr. E. P. Felt; "Injurious Insects of the Year," by Dr. Bethune and Mr. Gibson.

A few days after the close of the meeting the members of the Society and a host of friends all over the continent were shocked and deeply grieved at the sad tidings that our much loved President, Dr. James Fletcher, was no more. His death took place at Montreal, on Sunday, November 8th, 1908, after an operation from which he had not the strength to rally. A great man, a master mind, an enthusiastic student of nature, a most lovable personality has been taken from us. In our last report a full obituary notice was given. It is therefore unnecessary to enter into any further account of the work of our lamented friend.

"The Canadian Entomologist," the monthly magazine of the Society, has been regularly issued at the beginning of each month. The fortieth volume was completed in December last, and eleven numbers of the forty-first volume have already been published. The volume for 1908 consisted of 471 pages, and was illustrated by 11 full-page plates and 20 figures from original drawings. The contributors numbered 69 and included writers from Ontario, Quebec, Manitoba, Alberta, British Columbia, England, the United States, Brazil, Norway, and the Hawaiian Islands. The articles are, as usual, largely of a scientific character, and

contain much highly valuable matter. No less than 33 new genera were described, 282 new species and 9 varieties or subspecies of insects belonging to various orders.

The reports from the branches of the Society, at Montreal, Quebec, and Toronto, are highly satisfactory, meetings having been regularly held and many papers read and discussed. Owing to the absence of the Secretary in England no report was received from the British Columbia Branch.

Meetings of the Society were held from October to March at the Ontario Agricultural College, Guelph, on alternate Wednesday evenings. The attendance included a number of the more advanced students and a gratifying amount of interest was shown by all who attended. The following papers were read during the season: "The Sorghum Midge in Louisiana," by R. C. Treherne (4th year student); "A Classification of Muscoidean Flies," by W. R. Thompson (4th year student); "Rearing Pomace Flies," by E. W. Stafford (4th year student); "Suggestions for Field Inspection," by R. C. Treherne (4th year student); "Notes on Eriophydæ," by J. Tothill (3rd year student); "Memoir of the late Dr. Fletcher," by Dr. C. J. S. Bethune (Professor of Entomology); "Some Notes on Mites," by T. D. Jarvis (Lecturer in Entomology); "The Chalcidid Subfamily Encyrtineæ," by Alfred Eastham (4th year student); "Remarks on the External Anatomy of Chalcids," by A. C. Baker (2nd year student); "The Genus Tetranychus," by R. C. Treherne; "The Entomological Department at Macdonald College," by A. G. Cutler (4th year student); "Spiders," by Dr. C. J. S. Bethune; "Injurious Insects of the Season," by L. Caesar (Demonstrator in Entomology).

It is with deep regret that the Council have to record the death of Dr. William Brodie, of Toronto, who died on the 6th of August last, in his seventy-eighth year. He had recently been contributing a series of papers on Gall insects to the pages of the "Canadian Entomologist," and was occupied with the duty of looking after the collections in the Museum of the Department of Education. One of the oldest honorary members of the Society, Mr. William H. Edwards, died in the early part of the year. He had been one of the most regular contributors to the pages of the "Canadian Entomologist" during a long series of years and was known to the scientific world as the author of three most beautifully illustrated volumes on "The Butterflies of North America." We have also to deplore the loss of another contributor in the person of Prof. M. V. Slingerland, of Cornell University. Obituary notices of these gentlemen have already been published in the pages of the "Canadian Entomologist."

Efforts are now being made to hold an International Congress of Entomologists at Brussels, in August of next year. A large Committee has been formed to represent the Dominion of Canada, including members of our Society in all the different provinces. It is much to be hoped that we may be represented by one or more delegates, and that the forthcoming meeting may be a precursor of a long series in years to come.

It is with much regret that the Council has learned that the Rev. Dr. Fyles, for so many years the active President of the Quebec Branch, has resigned his position as Chaplain to the Immigrants and removed to Hull, P.Q. The rest and retirement which he has so well earned by many years of laborious work will, it is hoped, be long enjoyed by this veteran entomologist. Mr. A. R. M. Boulton has been elected President of the Quebec Branch, which will, no doubt, continue as active and enthusiastic as heretofore.

The Council has great pleasure in welcoming Dr. C. Gordon Hewitt, the newly-appointed Dominion Entomologist for the Experimental Farms. It is a

great satisfaction to know that we have a successor to the late Dr. Fletcher who has had a thorough scientific training and is evidently quite competent to take up and continue the work of his illustrious predecessor. The country is to be congratulated on the acquisition of so able a man and it is trusted that he will long continue to work out and develop the various phases of economic and systematic entomology which will devolve upon him. We welcome him most cordially also to the ranks of our Society.

Respectfully submitted,

TENNYSON D. JARVIS,
President.

REPORT OF THE MONTREAL BRANCH.

The 302nd regular, and 36th annual meeting of the Montreal Branch was held at 74 McTavish Street on May 8th, 1909.

The members present were: Messrs. Geo. A. Moore, in the chair; Henry H. Lyman, G. Chagon, G. A. Southee, E. C. Barwick, A. E. Norris, L. Gibb, F. Parkins, Jr., W. G. Gerth, A. M. Delisle, A. F. Winn.

The minutes of the April meeting and last annual meeting were read and confirmed.

St. Hilaire was selected as the locality for Victoria Day outing.

The Secretary read the following

REPORT OF THE COUNCIL.

During the season eight regular meetings have been held, the average attendance being eight members. Six new names have been added to the roll, and it is hoped that after the collecting season that they will help make our meetings interesting by bringing specimens of their captures as well as notes and queries on certain species.

At the beginning of the present year, the Mount Royal Entomological Club was amalgamated with our Society, their books, pamphlets and funds being handed over to us. To take the place of part of the work of the late club, it was decided to hold informal meetings between the regular dates or during the summer. Two of these meetings have been held; one in January was devoted to examining the collection of lepidoptera of the Secretary; the other in April at Mr. Barwick's, at which he showed his new cabinet and collection, and microscopic slides of insects were exhibited under three of the members' instruments.

The following is a list of the papers read:

Annual Address of President, Geo. A. Moore.
A Supposed Addition to Montreal Lists (Incisalia Henrici), Henry H. Lyman.
More Recollections, H. F. Winn.
Captures of Hemiptera at St. Hilaire, May 24, Geo. A. Moore.
"Go to the Ant, thou Sluggard," Henry H. Lyman.
Two Additions to the List of Montreal Butterflies, A. F. Winn.
Note on Junonia Cœnia in Maine, A. F. Winn.
On Water-Striders, Geo. A. Moore.
Respiration in Caterpillars, Henry H. Lyman.
A Trip to Gardiner, Maine, A. F. Winn.
A Small Collection of Insects from the Yukon, G. Chagnon.
The Genus Triphleps (Hemiptera), G. A. Moore.
Notes on a few Butterflies from the Yukon, Henry H. Lyman.
Notes on Hepialidæ, A. F. Winn.
Unnamed Capsidæ, Geo. A. Moore.

Pseudohazis Shastaensis, A. F. Winn.
The Shores of Ponds and Creeks as Collecting Grounds, G. Chagnon.
Note on Capture of Colias Philodice, var. Luteitincta, A. F. Winn.
A Card-Index Chart for Life Histories of Insects, A. F. Winn.
Butterfly Collecting in Manitoba (selected), Capt. J. G. Boulton, Quebec.
On Spittle-Insects, Geo. A. Moore.
Remarks on Prof. Poulton's Paper on Mimetic Species of Limenitis, Henry H. Lyman.
Structural Characters of Our Species of Agrilus, G. Chagnon.
On Luck, A. F. Winn.

The report of the Treasurer shows a balance on hand of $72.86. The incoming Council are reminded of one or two matters not yet finished, viz., the selection and purchase of a suitable bookplate, the completion of bound sets of the *Canadian Entomologist* for our library, as well as the arrangement of outings for the summer and a programme for winter months.

Respectfully submitted.

(Signed) Geo. A. Moore, *President.*

The President read the annual address, after which the election of officers was proceeded with, resulting as follows:

President, Henry H. Lyman; Vice-President, G. A. Southee; Secretary-Treasurer, A. F. Winn; Librarian and Curator, L. Gibb; Council, G. Chagnon, G. A. Moore, E. C. Barwick, F. Parkins, Jr.

Mr. Lyman read a paper, entitled, "A Spring Outing," describing a trip to Washington, D.C., and other places, made about April, 1908, illustrating his remarks by specimens of Lepidoptera and pressed plants.

The meeting then adjourned.

(Signed) A. F. Winn, *Secretary.*

REPORT OF TORONTO BRANCH OF ENTOMOLOGICAL SOCIETY FOR 1908-1909.

The thirteenth annual meeting of the Society was held on Thursday, June 10th, 1909, in the Provincial Museum, St. James' Square.

The President, Dr. Brodie, was in the chair, and the following members were present: Miss Blackmore, Mr. Smith, Mr. Miller, Mr. Williams, Mr. Cosens, Mr. Laing and Dr. Abbott.

The following officers were elected for 1909-1910:

President—Dr. Brodie.
Vice-President—Dr. E. M. Walker.
Secretary-Treasurer—Mr. J. M. Laing.
Librarian—Mr. J. B. Williams.
Curator—Mr. J. M. Laing.
Council—Mr. S. T. Wood, Mr. A. Cosens, Mr. T. J. Ivey and Dr. A. R. Abbott.

During the past year meetings were held with an average attendance of eight members. The Society held an excursion to Niagara Glen, which proved both profitable and enjoyable

The membership of the Society is now twenty-seven. During the past winter the tussock-moth and galls have received much attention, as the list of papers appended will show.

The Librarian reports that publications have been received from the Entomological Bureau at Washington, from the Ohio and Connecticut Experiment Stations, and from the New York State Museum; and, as in former years, the Society have subscribed for a copy of the *Entomological News*.

The Treasurer's report shows the finances to be in a satisfactory condition with a balance in hand of $1.35.

Respectfully submitted,

J. M. Laing, *Secretary-Treasurer.*

List of Papers Read: Galls, Dr. Brodie; The Tussock Moth, Dr. Brodie; Collecting in England, Mr. Williams; Galls, Dr. Brodie; Characteristics of the Order Orthoptera, Dr. Walker; Insect Mimicry and Evolution, Dr. Brodie; Ferns, Mr. Ivey; The Tussock Moth, Dr. Brodie.

TREASURER'S REPORT.

Receipts.		*Expenditures.*	
Balance from 1907-1908	$779 74	Late Treasurer's Exp., Nov. 16, 1909	$37 60
Late Treasurer to March 16, 1908	89 25	Printing	1,328 64
Back numbers	181 50	Annual Report	111 00
Annual Reports	19 25	Salaries	200 00
Refund of salary	33 00	Expenses, Postage, etc.	62 60
Advertising	12 48	Annual Meeting	80 81
Members' fees	397 62	Exchange on checks	5 10
Interest	7 40	Library books and binding	41 51
Printing extras	26 70	Supplies, pins, etc.	114 44
Supplies, pins, etc.	134 40	Balance	373 06
Expense: sale of cash-book and case	7 50		
Government grant—10 months..	666 00		
	$2,354 84		$2,354 84

J. E. Howitt, *Treasurer.*

Examined and found correct.

S. B. McCready,
J. W. Crow,
Auditors.

REPORT OF THE CURATOR.

The Society's collection during the last year has been increased by the addition of one hundred and eighteen new specimens. Of these, ninety were contributed by Mr. Charles T. Ramsden, Guantanamo, Cuba; twenty-two by Mr. T. Baird, High River, Alberta, and the rest by friends who do not wish their names published. Mr. Ramsden's contribution consisted of eighty-five specimens of Lepidoptera, chiefly butterflies and Spinx moths, one Orthopteron, three Diptera, and one Hymenopteron. These insects being almost solely exotic species have been placed in a case by themselves. All of Mr. Baird's specimens were moths, principally

belonging to the Noctuidae. These have been distributed among the different cases according to families and genera. The other insects presented consisted of four rare species of moths and two specimens of a rather rare scale insect.

The Society is greatly indebted to the contributors, especially to Messrs. Ramsden and Baird, for their generosity.

While gifts of Lepidoptera and Coleoptera are always welcome, there is great need of properly named species of Orthoptera, Odonata, Hemiptera, Diptera and Hymenoptera, and specimens of these orders are specially solicited from members or other collectors.

The collection has been thoroughly inspected from time to time and precautions taken to prevent loss from museum pests or from other causes. They are all in good condition and show no signs of deterioration.

Respectfully submitted,

L. Caesar, *Curator.*

REPORT OF THE LIBRARIAN.

During the year closing September 30, 1909, twenty-nine bound volumes have been added to the library, making the total number on the register exactly two thousand. There are also a very large number of periodicals, pamphlets and bulletins added to the shelves, many of which, it is hoped, will be bound during the next few months. No new book of any very great importance has appeared during the past year. Several parts of Wytsman's "Genera Insectorum" have been purchased and others will be added from time to time. Forty-three volumes have been taken out by members during the year, and the books have been largely used for consultation by students and members of the Society almost daily during the College terms. Recently the work of making a card catalogue has been resumed and will be carried on steadily throughout the winter. It is expected that a complete catalogue both of subjects and authors will be accomplished by the annual meeting next year. This will render the books in the library much more accessible and useful to the members.

Respectfully submitted,

Charles J. S. Bethune, *Librarian.*

REPORT TO THE ROYAL SOCIETY OF CANADA.

By Arthur Gibson, Delegate, Ottawa.

I have the honour to report that the Entomological Society of Ontario has had a most successful year during 1908. It was with very great regret, however, that we had to record the death of our beloved friend and president, Dr. James Fletcher, which occurred at the Royal Victoria Hospital, on Sunday morning, November 8th, 1908.

The forty-fifth annual meeting of the Society was held at the Ontario Agricultural College, Guelph, on Thursday and Friday, November 5th and 6th last. An interesting discussion took place at the first session on the chief insect pests of the

season. The annual report of the Society which recently appeared contains a full account of the proceedings, with the papers presented at the meeting published in full. This is a report of 152 pages and is one of the most valuable ever published by the Society. Among the papers which are here printed, the following may be mentioned:

The Interpretation of Nature. By E. P. Felt, Albany, N.Y.

The Economic Importance and Food Habits of American Gall Midges. By E. P. Felt, Albany, N.Y.

Observations on the Sorghum Midge. By R. C. Treherne, Ontario Agricultural College, Guelph.

Hydroecia Micacea, Esp. in Canada. By Arthur Gibson, Central Experimental Farm, Ottawa.

Further Notes on the Coccidae of Ontario. By Tennyson D. Jarvis, O. A. College, Guelph.

Some Enemies of Ontario Coccidæ, By J. W. Eastham, Ontario Agricultural College, Guelph.

"Some Beetle Haunts," by an Amateur Botanist. By F. J. A. Morris, Trinity College School, Port Hope.

A Catalogue of the Gall Insects of Ontario. By Tennyson D. Jarvis, O. A. C., Guelph.

Entomological Record, 1908. By James Fletcher and Arthur Gibson.

Insects of the Year 1908 at Ottawa. By Arthur Gibson, C. E. F., Ottawa.

Present Condition of the Work Connected with the Importation of the Foreign Parasites of the Gipsy Moth and Brown-tail Moth. By L. O. Howard, Washington, D.C.

What Entomology the Farmer and Fruit Grower should know. By Wm. Lochhead, Macdonald College, Que.

Injurious Insects in Ontario in 1908. By C. J. S. Bethune, Ontario Agricultural College, Guelph.

Injurious Insects of uebec in 1908. By William Lochhead, Macdonald College, Que.

The Farmer's Wood Lot. By Rev. Thos. W. Fyles, Levis, Que.

Life History of Euchætias Oregonensis, Stretch. By Henry H. Lyman, Montreal.

The Society's branches at Quebec, Montreal, Toronto, Guelph and Vancouver all report a most active year. They have all held regular meetings at which papers have been read and specimens exhibited for discussion. The British Columbian Branch publishes a Quarterly Bulletin, which gives concisely the work of the local members. Valuable notes on captures are included from time to time.

The library of the Society, at its headquarters in Guelph, is continuously growing. During the year ending August 31st, 1908, 49 bound volumes were added to the Library, making the total now on the register 1,971. The books of the Society are consulted almost daily by members and also to a considerable extent by the students of the Ontario Agricultural Society.

Some interesting donations have been made during the year to the Society's collections of insects. These collections are now being gone over and many old specimens have been replaced by fresher examples, bearing fuller particulars as to locality, date of collection, etc.

The *Canadian Entomologist*, under the continued able editorship of the Rev. Prof. C. J. S. Bethune, completed last December its fortieth volume. This is a much larger volume than usual, containing 471 pages. Its articles are of the greatest value to entomologists, in fact it is absolutely necessary for anyone who studies insects to any extent, to subscribe to it. Sixty-nine different entomologists contributed to its pages last year, and a number of full page plates appeared as well as numerous figures in the text. It is impossible here to give a list of the papers published, but the following are some of the more important:

British Columbia Syrphidæ, New Species and Additions to the List. By Raymond C. Osborn, Columbia University, New York.

New Histories and Species in Papaipema (Hydrœcia). By Henry Bird, Rye, N.Y.

Studies in the Genus Incisalia. By John H. Cook, Albany, N.Y.

Notes on the Lepidoptera of Kaslo, B.C., with Descriptions of Seven New Species. By George W. Taylor, Wellington. B.C.

New Species of Colorado Aphididæ, with Notes upon their Life-Habits. By C. P. Gillette, Fort Collins, Colo.

Notes on Noctuidæ. By Sir G. F. Hampson, British Museum, London.

List of Hemiptera taken by W. J. Palmer, about Quinze Lake, Que., in 1907. By E. P. Van Duzee, Buffalo, N.Y.

New Species of Dolerinæ. By Alex. D. MacGillivray, Ithaca, N.Y.

Type and Typical. By Henry H. Lyman, Montreal.

Further Notes on Alberta Lepidoptera. By F. H. Wolley-Dod, Millarville, Alta.

Notes on Tenthredinoidea, with Descriptions of New Species. By S. A. Rohwer, Boulder, Colo.

New Species of Theridiidæ. By Nathan Banks, East Falls Church, Va.

Notes on the Species of Rhynchagrotis Sm., with Descriptions of New Species. By John B. Smith, New Brunswick, N.J.

Recent Work among the Borers. By Henry H. Lyman, Montreal.

Remarks on Some New Pselaphidæ. By Thos. L. Casey, Washington, D.C.

Blennocampinæ—Descriptions of New Genera and Species—Synonymical Notes. By Alex. D. Macgillivray, Ithaca, N.Y.

Notes on the Pterophoridæ or Plume-Moths of Southern California, with Descriptions of New Species By Fordyce Grinnell, Jr., Pasadena, Cal.

Some Remarks on the Phylogeny of the Hemiptera-Heteroptera. By G. W. Kirkaldy, Honolulu, Hawaiian Islands.

A Key to the North American Species of Aeshna found North of Mexico. By E. M. Walker, Toronto.

Notes on the Coccinellidæ. By Thos. L. Casey, Washington, D.C.

"Some Beetle Haunts, by an Amateur Botanist. By F. J. A. Morris, Trinity College School, Port Hope, Ont.

ADDRESS OF THE PRESIDENT.

By Tennyson D. Jarvis, Ontario Agricultural College, Guelph.

It is my happy privilege to preside over the present meeting and very thankfully do I accept the position which you have so kindly imposed upon me. I have the peculiar privilege of succeeding the late lamented Dr. Fletcher, whose labours and abilities need no words of praise or encomium from me, as they are so well known and so thoroughly familiar to you all.

Besides the late Dr. Fletcher, who so eminently strove to advance the interests and welfare of this Society, we also most sincerely deplore the loss of the activities in our behalf of the late Dr. Brodie, of Toronto. In the neighbouring States William Ashmead, Prof. Slingerland and W. H. Edwards have departed since our last meeting, and the entomological world suffers an immeasurable loss. The results of their untiring zeal and labours to discover what we might know, and what we should know, of the science of entomology have impressed their effects deeply and indelibly upon the minds and in the hearts of all students of this extensive and intricate science.

In the interests of entomology I must congratulate this Society and the country at large on the arrival of Dr. C. Gordon Hewitt, of England, now active at the Central Experimental Farm at Ottawa, and one whose reputation for good work in scientific and economic Entomology had preceded him to this country. Since the decease of the late Dr. Fletcher the department over which he presided has been divided, the Entomological division being taken charge of by Dr. Hewitt, ably assisted by Mr. Gibson, and the Botanical division by Mr. H. T. Gussow, assisted by Mr. Groh.

I regard with pleasure the many new and effective methods which have arisen and have been adopted during the past few years for the diffusion of the know-

ledge of the science of Entomology. The work of the agricultural experts attached to High Schools in several counties of Ontario, will give a great stimulus to the study of Entomology. The office of the experts includes the teaching of the science in the high school, the conducting of experiments in farmers' orchards and elsewhere, giving advice on agricultural matters and establishing libraries in each county which will contain work largely devoted to Nature Study. Teachers of high and public schools have taken up the subject with more or less success and their work has been very prolific of good results. Another method, and one which may in course of time be a most powerful one to increase the study of entomology, is the three months' course at the Ontario Agricultural College for Normal School students. Nearly two hundred students have during the past year availed themselves of this opportunity, and the number promises to be largely increased in future years.

There is also the nursery and orchard inspection conducted through the horticultural branch of the Department of Agriculture by which an intimate knowledge of injurious forms of insects is obtained and remedies are applied to prevent their increase and spread through infected fruit or stock. The Natural History Societies, with their publications on Nature Study, their excursions, their periodical meetings where eminent scientists are frequently invited to address the members, and in many other ways, have made great strides forward in obtaining and diffusing the knowledge of insects. Another attractive method for the enlightenment of the farmer, nurseryman and others upon this subject of insects, is found in the bulletins issued from time to time by experimental stations and agricultural colleges, by which the quintessence, as it were, of the subject is brought to easy view within a few pages of reading matter. I must also acknowledge the good work of the *Farmer's Advocate, Canadian Horticulturist,* and the *Weekly Fruitgrower* for their assistance in the diffusion of knowledge and the instruction of their readers. These periodicals merit highly the splendid patronage accorded to them.

From the position which I at present occupy I feel impelled to acknowledge that a large share of the means of disseminating a knowledge of the workings of our Society throughout the world is due to the *Canadian Entomologist,* our monthly magazine edited by Dr. Bethune. This publication has long since attained a position of celebrity in literary and scientific circles for the thorough information it imparts and the high standard of excellence it has attained and achieved.

The graduates from this College in the Department of Biology also deserve to be mentioned as a potent factor in the gathering of facts and diffusing knowledge in this science. Their studious and untiring researches and investigations, the zeal and energy with which they enter into their task, and the interchange of ideas resulting from them have greatly assisted in attaining a thorough knowledge of certain families of insects under all kinds of climatic conditions.

We should not overlook the work of this College and of kindred institutions in the diffusing of the knowledge of Entomology and the stimulus they impart to research. Hundreds of students therein, undergraduates, are during the most favourable season of the year engaged in the gathering of insects and in the study of their life histories, their habits and their workings.

A great deal is done for the spread of information regarding insects by the professors at the Colleges where the science of Entomology forms part of the curriculum, by correspondence with people of various pursuits making inquiries. There have been many hundreds of such enquiries answered during the past year by Dr. Bethune of this College, and his colleagues, and no doubt the same may be said respecting the correspondence in other Colleges of a similar character.

The lectures given by professors and graduates of Agricultural Colleges, and by others who have given the matter thought and study, upon all branches of Nature Study at meetings and gatherings of various kinds, also greatly assist in disseminating in a more or less successful way, the knowledge of this science and the useful application of what we know about insects.

Among some of the latest and best works upon the subject of insects published during the past year may be mentioned "Our Insect Friends and Enemies," by Dr. J. B. Smith; "Insects and other Allied Pests, etc.," by Fred V. Theobald; and "Fruit Trees and Their Enemies," by Spencer W. Pickering.

It is to be regretted that in the cause of research the methods employed are not always calculated to bring about the best possible results. Persons engaged in this work are often too easily contented with the discovery of individual insects and fail to profit by the study of a family group of them. In this regard the pursuit of research should be continued with more and better system and it would be well to inculcate into the minds of all entomologists that this science must be studied, not from individual insects alone, but also from observing the life history, the habits, the qualities and working of whole families. However, the proper methods have been adopted by a number of eminent scientists in this country and the United States as we learn from the reports of their successful researches.

It is to be hoped that the governments of the day will be as generous, or even more so, in giving aid for the benefit of the science of entomology as they have been in the past, so that the work or research and the diffusion of information may not suffer from want of the means to carry them on. When able men, aided by the necessary means, are active, great results may be expected, and with the stimulus of new discoveries constantly before them, there is no fear that we should suffer disappointment; the benefits to our country and its people derived therefrom, will in all probability be equal to, if they do not surpass, any investment of energy and means in other causes.

In closing my remarks I desire to thank you very heartily for your attendance here, for the excellence of your addresses, and the patience and close attention you have exercised during this meeting. If the enthusiasm for the science of entomology which you have displayed during this session is a true exponent of the spirit within you, it augurs well for profitable and successful years to come for the Entomological Society of Ontario.

THE ORIGIN AND DIFFUSION OF ENTOMOLOGICAL ERRORS.

By Henry H. Lyman, Montreal, Que.

Though using the word entomological, I shall confine my remarks to the Lepidoptera as the only order which I have studied, but doubtless similar conditions have given rise to similar errors in the other orders.

Anyone who has looked over many collections of North American Lepidoptera must have been struck by the number of mis-identifications of species, or transpositions of names to be found in them, and an interesting study could be made of the numerous popular errors which have become current in time past, and which in many cases still persist. Indeed, their universality and persistence is quite remarkable and it seems almost hopeless to try to eradicate them.

Their origin can in most cases only be surmised, but their diffusion and persistence can be easily accounted for. In Europe they have always been much better supplied with illustrated works on Entomology than we have been on this continent, and this is easily accounted for. In the first place the science was studied there long before it was here and many North American insects were described by European authors. Then there has always been a much larger number of collectors in Europe than in America, and if many of them have done nothing else to advance the science, their subscriptions have at least rendered possible the issue of well illustrated works, which was also assisted by the much cheaper rate at which such works could be produced in Europe than in America.

The earliest important work devoted to the Lepidoptera of North America was the magnificent work by Abbot and Smith, in two large folio volumes on "The Natural History of the Rarer Lepidopterous Insects of Georgia," which was published in London in 1797, but this was a costly work and only found its way into the more important libraries and to a few wealthy collectors.

Thomas Say, who has been called the Father of American Entomology, wrote between 1818 and his death in 1834, but it was only in 1859 that his complete writings on Entomology were collected by Dr. John L. Leconte, and issued in two volumes. Of the 54 coloured plates, only 12 were devoted to the Lepidoptera, most of the others being given to the Coleoptera. In 1841 appeared the first edition of Dr. Harris' classic work on the "Insects of Massachusetts Injurious to Vegetation," and other editions were issued in 1842 and 1852, and the revised edition by Flint in 1861. But from none of these works could the names of more than a very few of the moths of this continent be learned, and, therefore, collectors were dependent upon the leading authorities in the various branches for the determination of their captures.

As Mr. Grote was the leading authority upon the Noctuidæ, he was probably the one most frequently appealed to for determinations, indeed, he once advertised that as his time was so much taken up with this work he would for the future make a charge for naming specimens, which probably had the effect of materially reducing the applications.

Another who did a great deal of this work was Dr. Herman Strecker, who advertised his readiness to determine material sent him.

Under such conditions it can be easily understood that mistakes would be sure to arise. In many cases duplicate specimens would be numbered and sent for name, corresponding numbers being placed on other specimens, which were retained by the collector. Unless specimens were rare, their return would often not be asked, in order to avoid the return express charges, but a list with numbers and the names would be returned.

Mistakes might happen in many ways. As has been said, "no one is infallible, not even the youngest of us," and these high authorities would certainly have some errors in their collections, and so name these species wrongly for others. Again, in handling the specimens, the numbers of a couple might drop off and then be accidentally transposed in replacing them, and this might occur either in the hands of the one who named, or the collector who sent them. Or the collector might make a mistake and think two closely allied forms the same and send one for name, while retaining the other as his numbered specimen.

Given an initial error, its spread would be inevitable. John Brown, who had had his specimens determined by so high an authority as the celebrated Dr. Blank, would at once become an authority among those of his acquaintance whose specimens have not been so authoritatively determined, and these collectors would be

only too willing to have him name their specimens for them, and these in turn corresponding and exchanging with others would still more widely diffuse the error.

One error which has become very widely diffused is the transposition of the names "Gortyna nitela Guen." "Gortyna nebris Guen."

The author of those names described *nebris* first mentioning the white spots and then in the description of *nitela* wrote: "Taille et couleur de la *Nebris,* dont elle ne diffère que par l'absence complète des taches blanches," and yet in most collections the white marked one is called *nitela* and the one without white spots *nebris.*

Another common error is the transposition of the names *petulca* and *ferrealis* in the genus Xylina, which was current in all our Montreal collections from the time that Grote and Strecker were naming material for the late Mr. Caulfield, until I discovered the transposition when studying the genus a few years ago.

That that error must also have been widespread may be inferred from the fact, pointed out by Dr. J. B. Smith, that Dr. Holland figured *ferrealis* under the name *petulca.*

Of course, an error could not become almost universal unless some prominent authority were himself in error, and that has undoubtedly frequently been the case.

Dr. Scudder's writings afford several curious instances of this. In 1863 he published in the Proceedings of the Essex Institute of Salem, Mass., "A list of the Butterflies of New England," in which he describes as new *Melitæa Œnone* and *Melitæa Harrisii,* the latter being the species which Harris had placed hesitatingly under the name Melitæa Ismeria, Boisd. and Lec. Subsequently he ascertained by comparison of his *Œnone* with types of M. Nycteis, Doubl, and he had redescribed the latter species, so in his "Supplement to A List of the Butterflies of New England," published in Proc. Bos. Soc. Nat. Hist. XI., 1868, he corrected his error in regard to it, but in some way which he was never able to explain, made another error in saying that *M. Ismeria?* Harris was a synonym of Nycteis and not of M. Harrisii Scudder. In his magnificent work on the Butterflies of New England he made three transpositions. On plate 3, he transposed the numbers of the figures of *Grapta Interrogationis* var. Umbrosa and var. Fabricii, this he corrected in the appendix. On plate 10, he transposed the numbers of what he called Atrytone Zabulon male and female, but which is really Hobomok, and to this I called his attention, and in his third volume, in the part devoted to butterflies not found in New England, he transposed the descriptions of Brenthis Freija and Chariclea.

More recent examples of curious transpositions are well known to most of us occurring in Holland's beautiful "Moth Book," and these, unfortunately, will have a wider effect on account of the thousands who will use the book, not one in ten of whom will ever see the corrections which have been published.

Another class of errors is composed of those which have a purely typographical origin. A curious one of this kind, which, however, has no importance, occurs in a paper by C. E. Worthington, formerly of Chicago, Ill., entitled "Notes on Argynnis Alcestis." (Can. Ent. X. 38.) After saying that both Alcestis and Aphrodite were found in the neighbourhood of Chicago, but generally at different localities, he says: "I have been greatly surprised at the readiness with which a strong *aphrodite* upon the prairie can be distinguished, while on the wing from the surrounding *alcestis,* etc.," and I feel sure he wrote "stray," but that it was misprinted "strong," and this error was reproduced by Edwards in his magnificent work on the "Butterflies of North America."

More serious errors of typographical origin, or perhaps merely through careless transcription, are those in connection with names.

Plate.	Fig.	Name Given.	Should Be.	Correction By.	Publication.
vi.	1	*Cocytius antæus, Dru*	*C. cluentius Cr.* ♂	E. A. Smyth, Jr.	*Ent. News*, xv., 105.
xvi.	9	*Hyphantria cunea*	*H. textor*, as in text	H. H. Lyman	
xvii.	23	*Euthisanotia grata*	*E. unio*	E. J. Smith	*Ent. News*, xvi., 88.
	24	" *unio*	*E. grata*	"	"
	16	*Alypia Langtoni* ♂	*A. octomaculata*, as in text	H. H. Lyman	
xviii.	14	*A. lepusculina*	*A. populi*, as in text	"	
	16	*A. Radcliffei*	*A. albarufa*, as in text	"	
	24	*A. xyliniformis*	*A. lithospila*, as in text	"	
xxiv.	34	*Heliophila albilinea*	*H. diffusa*	E. J. Smith	*Ent. News*, xv., 221.
xxv.	9	*Xylina petulca*	*X. ferrealis*	J. B. Smith	*Ent. News*, xv., 104.
xxvi.	5	*Papaipema inquæsita*	*P. impecuniosa*	E. J. Smith	*Ent. News*, xv., 221.
	8	" *nebris*	" *nitela*	"	"
	9	" *nitela*	" *nebris*	"	"
xxix.	66	*Cydosia majuscula*	*Tricostibas calligera*	H. G. Dyar	*Can. Ent.*, xxxvi., 26.
xxx.	15	*Drasteria crassiuscula*	*D. erechtea*	E. J. Smith	*Ent. News*, xv., 221.
xxxi.	4	*Catocala subviridis*	*C. Agrippina*	Wm. Beutenmuller	*Can. Ent.*, xxxvii., 292.
	8	" *retecta*	*C. luctuosa*	"	"
	11	" *flebilis*	*C. Angusi var. luctla*	"	"
	14	" *obscura*	*C. residua*	G. H. French	*Can. Ent.*, xxxvi., 54.
xxxii.	5	*C. dejecta var. Carolina Holl.*	*C. flebilis*	Wm. Beutenmuller	*Can. Ent.*, xxxvii., 292.
	6	*Catocala relicta*	*C. relicta var. clara*	"	"
	7	" " *var. bianca*	*C. relicta*	"	"
xxxiii.	1	" *Californica*	"Looks like a pale C. Irene"	"	"
	4	" *Ultronia var. Celia*	*C. Ultronia var. Adriana*	"	"
xxxiii.	7	*Catocala Ultronia var. mopsa*	"Not *mopsa*, but another var."	"	"
	8	" *Augusta*	"Looks like *C. Californica*"	"	"
xxxiv.	7	" *ilia var. osculata*	"Looks like *C. ilia*"	"	"
xxxv.	1	" *amasia*	*C. sancta*	"	"
	2	" *similis*	*C. similis var. aholah*	"	"
	3	" " *var. aholah*	*C. similis*	"	"
	5	" *fratercula var. jaquenetta*	"Looks like *C. blandula*"	"	"
	7	" *præclara*	*C. gracilis var. sordida*	"	"
	13	" *Stretchii*	*C. Mariana*	G. H. French	*Can. Ent.*, xxxvi., 54.
	14	" *Californica var. Cleopatra*	"Looks like *C. Californica*"	Wm. Beutenmuller	*Can Ent.*, xxxvii., 292
	15	" *Rosalinda*	Looks like *C. Californicc var. Cleopatra*	"	"
xlii.	32	*Tephroclystis absinthiata*	*Macaria infimata*	H. G. Dyar	*Can. Ent.*, xxxvi., 26
	25	*Palcacrita vernata*	*Alsophila pometaria*	G. W Taylor	*Can. Ent.* xxxvi., 245.
	49	*Mesoleuca intermediata*	*Petrophora fluctuata*	"	"

CORRECTION OF ERRORS IN HOLLAND'S MOTH BOOK.

Plate.	Fig.	Name Given.	Should Be.	Correction By	Publication.
xliii.	10-11	*Hydriomena custodiata*	*Hydriomena excurvata*	H. G. Dyar.....	*Can. Ent.*, xxxvi., 26.
	36	*Deilinia variolaria*	*Deilinia erythremaria*	G. W. Taylor.....	*Can. Ent.*, xxxvi., 245.
	39	*Philobia enotata*	*Philobia notata* (of Europe).....	"	"
xliv.	2	*Caripeta angustiorata*	*Caripeta seductaria*	"	"
	32	*Plagodis emargataria*	"I think *P. alcoolaria*"	"	"
xlvii.	15	*Euclea chloris*	*E. indeterminata*	H. G. Dyar.....	*Can. Ent.*, xxxvi., 26.
	21	*Cochlidion y-inversa*	*Tortricidia flexuosa*	"	"
	27	" *rectilinea*	*C. latomia*	"	"
xlviii.	22	*Tortrix albicomana*	"Is very unlike the type".....	W. D. Kearfott.....	*Ent. News*, xv., 105.
xlviii.	24	*Platynota flavedana*	*Olethreutes nimbatana*	"	"
	40	*Epagoge tunicana*	"Probably *Sparganothis senecionana*"	"	"

Corrections to the "Key to the Families," supplied by Dr. H. G. Dyar.
Page 24: Under 3, for 15 read 14. Under 14, for 17 read 16.
Page 25: Under 25 add a line, "Fore wing with vein 5 nearer to 4 than to 6 26." Under 26, for 26 read 27.
On page 62 the reference after Hæmorrhagia thysbe should be to Plate II., not I.
On page 337 Epelis faxoni Minot is referred as a synonym of Epelis truncataria Walk. E. J. Smith, *Ent. News*, xv., 221, says erroneously.

Page.	Text. Fig. Named.	Should Be.	Correction By.	Publication.
378	*Inguromorpha basalis*	*Cossula magnifica*	H. G. Dyar.....	*Can. Ent.*, xxxvi., 26.
379	*Cossula magnifica*	?	"	"

In *Ent. News*, xv., 105, W. D. Kearfott says, "Several of the generic names used by Dr. Holland differ from those used in Prof Fernald's latest published list of Pyralids, Zinckenia Zell. for Hymenia Hbn., Glyphodes Gn. for Diaphania Hbn., Phlyctænodes Gn. for Loxostege Hbn., and he has repeated the error which occurs in both Dyar's Catalogue and Smith's 1903 List, Alceris in place of Acleris."

Most collectors know the pretty moth named *Plusia Ærea*, Hubn, and the one so much like it that it was named *Æreoides* by Grote. The name of the latter was correctly printed up to the issue of Dr. Smith's Catalogue of Noctuidæ in 1893, in which it appeared cut down to Æroides, but whether through the error of author or printer, I am unable to determine, and since then I have hardly ever seen it correctly spelled anywhere. Dr. Dyar fell into the same error in his catalogue of 1902, though he gave the correct spelling in his index, and Dr. Smith, in his check list of 1903, repeated the error, and everywhere the same erroneous spelling is copied, including publications issued by Dr. E. P. Felt, State Entomologist of New York, and in the lists of British Columbian Lepidoptera recently issued.

In order to render my copy of Dr. Holland's Moth Book as correct as possible, I have tabulated the corrections which have been made from time to time in different publications by different writers, and have myself discovered five discrepancies between names on plates and in the text. If any corrections have been made which I have not noticed, or if any of the corrections have been proved erroneous, I would greatly appreciate being informed of the facts.

CONFLICTS BETWEEN ANTS.

By G. E. Sanders.

Following are notes on a series of conflicts between two species of ants—*Myrmica scabrinodes sabuleti*, Meinert, and *Lasius niger Americanus*:

While making night observations on the Corn-root ant, *Lasius niger Americanus*, in August, 1909, Mr. W. P. Flint and myself accidentally caused a very curious conflict between the workers of a Lasius nest, and those of a nest of Myrmica. For the three nights following we were fortunate enough to have it repeated and to get several variations in the original procedure of Myrmica. It is on these variations in the actions of Myrmica that I intend to dwell particularly, and I will leave it to the reader to decide as to whether we had an unusual series of accidental happenings, or if Myrmica is endowed with a certain amount of reason.

To describe the situation:—The Lasius nest, containing about 250 workers, was situated under the edge of a wide furrow which we had plowed through a corn field: the furrow was 6 inches deep, and the bottom of it cleaned out with shovels, leaving a smooth surface, one foot in width. The Myrmica nest, containing about 60 workers, was situated in the bottom of this furrow, about 8 inches away from the opening of the Lasius nest; 6 inches beyond this, and in the bank opposite the first Lasius nest, was a second Lasius nest, containing about 150 workers.

Both species of ants are for the most part nocturnal, at least in their movements on the surface. During warm nights throughout the summer one will find from 1-10 to 1-4 of the workers of a Lasius colony on the surface, foraging within two feet of the entrance to the nest; a few individuals forage at greater distances, but the majority forage near the nest. This enables them to attack and kill, by force of numbers, almost any small insect, up to the size of the common Carabid, *Agonoderus pallipes*, which is unfortunate enough to fall among them. They exhibit great courage and skill in attacking these insects, which are often 12 to 15 times as heavy as a Lasius worker. Myrmicas seldom forage near their nest; they forage

singly at great distances, often 10 feet from the nest, and seldom attack living insects. It often happens that a Myrmica, in foraging, will wander into a migrating line or band of Lasius foragers. Several Lasii will immediately attack it, one holding to each leg or *antenna,* and will drag it from the vicinity of the nest or line, as it happens to be, and there leave it to go as it will, making no attempt to kill it. The Myrmica, in such cases, offers no resistance whatever, and will remain almost motionless while being dragged away. Occasionally a solitary Myrmica and a solitary Lasius will meet, and while the Lasius will usually avoid the Myrmica, it will sometimes attack the larger ant. In such cases the Myrmica will stand higher in the air than usual, moving about slowly, keeping the Lasius, which is attempting to get a hold on its legs or antennæ, a little to one side and slightly in front of its head. They will often fence in this manner for a minute or more until the Lasius gets in the proper position, when the Myrmica, with a spring, swifter than one would imagine such an ungainly ant capable of, will seize the Lasius, usually by the petiole from the upper side, and lifting it in the air, will carry it to the nest, possibly for food.

Myrmica, while a very sluggish and awkward ant, shows itself in cases such as the two mentioned (and probably 100 of each were observed during the summer), to be a very cool, deliberate, and, if such a term may be used, calculating ant. Lasius moves more quickly, and apparently more blindly than Myrmica.

On the night of August 18th and 19th, while feeding the foragers about the larger Lasius nest, some of the food insects dragged themselves near the opening of the Myrmica nest before they were overpowered. In the excitement of capturing the insects, 75 to 100 Lasius had come out from their nest and were busily engaged near the Myrmica entrance in dragging the dead insects back to their own nest. At this moment a single Myrmica appeared at the opening of its nest, and in a second disappeared. In less than a minute three more Myrmicæ appeared and after running about on the surface for a few seconds in an excited manner, disappeared into their entrance. A few seconds later the whole colony of Myrmicæ, with the queen, came pouring from their nests, many of them carrying young, and very evidently prepared to migrate. A few of the Myrmicæ attacked the Lasii nearest them, while the rest ran about aimlessly for a few seconds, and then returned the young to the nest. The majority of the Myrmica workers now began an earnest attack on the Lasii, driving them slowly away from the insects which they had captured, and in the course of 15 minutes had them all driven back into their nest, leaving the insects near the Myrmica nest where they had abandoned them. The queen Myrmica remained on the surface only a few moments after the young were returned to the nest; she did not go more than three inches from the entrance and took no part in the battle.

After the Lasii had all been driven in, most of the Myrmicæ returned to their nest, leaving about 20 of their number, apparently standing guard, about the Lasius entrance, where they remained for some time, the last ones leaving and returning to their own nest about twenty minutes after the last Lasius had disappeared. The Myrmicæ in returning to their nest scarcely noticed the dead insects, two of them dragged a dead back-swimmer about for a moment and abandoned it. The remains of the insects were found at their entrance the next morning, showing that during the night they had dragged them in and devoured them.

On the night of August 19th-20th, the Lasii were brought near the Myrmica nest by feeding with living insects, this time purposely. The Myrmicae in appearing on this night were somewhat less excited than on the previous night,

most of them attacking the Lasii as soon as they emerged from the nest. A few young, less than ten, were brought to the surface, as they emerged, and immediately returned to the nest. The queen remained in the nest throughout this battle. The time occupied in driving the Lasii into their nest was about fifteen minutes. After they were driven in, a number of the Myrmicæ—about 20—remained at the entrance as before, the last of them leaving the entrance fourteen minutes after the battle proper closed.

On the night of August 20th-21st, the Lasii were enticed out near to the Myrmica nest in the same manner as before. Their presence was discovered by two Myrmica workers which alarmed the nest. The Myrmicæ, in appearing on this occasion, did not bring their young with them, but among the last of the ants which came pouring from the entrance, the queen appeared. The Lasii were at once attacked and driven away from their captures and in about fifteen minutes were all driven into their entrance. The queen Myrmica remained on the surface not more than two minutes; her presence there was probably accidental. It is possible that she was caught in the swarm of workers emerging and carried along with them. She took no part in the battle, not going more than an inch from the entrance to her nest. The Myrmicæ on this night did not remain at the Lasius entrance more than two minutes after the last Lasius had disappeared.

On the night of Aug. 22nd-23rd, the drawing out of the Lasii and the emergence of the Myrmica workers was exactly the same as on the previous nights, excepting that the queen did not appear. No young were brought to the surface by the Myrmicæ on this occasion. The Lasii were driven from their food and into their nest in approximately the same time as on the two previous nights. After the Lasii had all disappeared the Myrmicae scarcely remained at their entrance at all, returning to their own nest almost immediately.

On the night of Aug. 23-24th we had an exact duplicate of the proceedings of the previous night, until the battle was well under way, when we drew out the second and smaller nest of Lasius. By using insects which they were particularly fond of we drew them up to the rear of the line of fighting Myrmicae, about as near the Myrmica nest as the first nest of Lasius had been when the Myrmicae attacked them. When this second nest of Lasius came near so that the Myrmicae began to notice them the last of the large nest of Lasii were disappearing. The appearance of this second nest seemed to demoralize the Myrmicæ, which were already in some disorder, and instead of attacking, as we expected they would, most of them ran around the cluster of Lasii and disappeared into their nest; a few of them attacked the Lasii, but not being supported, fell off and returned to the nest, leaving the second nest of Lasius in full possession of their insects, which they dragged to their nest.

On account of the nights becoming suddenly colder, we could not get Lasius to come out, and so had to discontinue the observations. One of the most curious things was the apparently regular battle formation of Myrmica. In every case, soon after the conflict began the Myrmicæ would form in a somewhat irregular line, with only a few workers behind, and a few in front of this line, those behind fighting with the straggling Lasii, and those in front being attacked by several Lasii and seldom moving, simply allowing the Lasii to pull at them. The line was always thickest at the centre, and thinnest at the ends where the Lasii were least numerous. The ends in all cases advanced faster than the centre, so that towards the end of the battle the line would assume the shape of a horseshoe. On the night of the 23-24th when we brought up the second nest of Lasii behind this apparent formation, which was already partially broken up in driving the

first nest of Lasius into its entrance, the Myrmicæ apparently did not know what to do. A few put up a weak fight and in a few moments all retreated, leaving the Lasii in possession of their insects right at the Myrmica entrance. There were plenty of Myrmica workers out to drive off the Lasii, for there were not nearly as many of the second nest out as there had been of the first. Does this indicate that the Myrmicæ fight in a more or less regular formation, and being surprised when this formation was broken up, they retreated rather than fight?

Another thing: On the night of August 18-19th, when the Myrmicæ were first disturbed they brought all of their young to the surface with them. From having seen dozens of Myrmica migrations, we can say positively that they were fully prepared to migrate. On the second night we find only a few young brought to the surface and immediately returned, showing them to be less excited over the presence of Lasius than on the previous night. On the third, fourth and fifth nights no young were brought to the surface at all. It was fear that induced them to bring their young to the surface the first night; on the second night we find that fear greatly abated, as fewer young were brought to the surface and kept there for a much shorter time. On the third, fourth and fifth nights we find no young brought to the surface; so, evidently, they had no fear of their nest being raided by Lasius. Can we conclude that this nest of Myrmica was profiting by experience? It certainly was showing a degree less of alarm over the appearance of Lasius after each successive conflict.

Again, on the first night of the battle, the Myrmicæ stood about the entrance of the Lasius nest for 20 minutes after the last Lasius had disappeared. Whether they were simply wondering where they had gone, or, whether they expected them back, and so were picketing the entrance to prevent their reappearance, we cannot say. On the second night we find them waiting about this entrance for less than 15 minutes. On the third night we find them waiting less than two minutes, and on the fourth night, scarcely waiting to drive the last Lasius in. Does this indicate that they slowly proved to themselves the futility of waiting; that they remembered their earlier experiences, and so did not wait at all on the night of the 22-23rd?

The notes on these conflicts were taken at the same time, separately by Mr. Flint and myself, and later compared. The notes on the behaviour of Myrmicæ, when in ordinary conflicts with the Lasius, are from hundreds of observations, and go to show the cunning of the Myrmica in battle.

The questions which I am not attempting to answer, are those which suggested themselves to Mr. Flint and myself when taking the notes.

THE SPRUCE BUD-WORM, TORTRIX FUMIFERANA, CLEMENS.

By Arthur Gibson, Chief Assistant Entomologist, Experimental Farm, Ottawa.

During the early part of the past summer the Spruce Bud-worm was especially abundant in Canada. Towards the end of July the Deputy Minister of the Department of Agriculture was informed by the Hon. Senator Edwards that some kind of an insect was doing much damage to spruce and balsam trees in the above district, and as a consequence I was instructed to proceed at once to the infested locality, to investigate the outbreak.

Early on the morning of July 29th, therefore, I left Maniwaki, Que., in company with Mr. M. Boyle, of the W. C. Edwards Company, and drove to Baskatong, about 40 miles due north, which place we reached about 5.30 in the afternoon. Around Baskatong the injury to spruce and balsam was very apparent, owing to the conspicuous reddening of the tops of the trees. Early the following morning we left Baskatong and spent the whole day examining trees at different points. As soon as the first tree was cut down I saw at once that a lepidopterous insect had been at work. Thousands of the empty pupal cases of the moths were present on the trees, and these, with the partly eaten and discoloured dead foliage, together with the excrement from the caterpillars, gave the conspicuous reddish appearance to the tops of the trees. The injury for this year, of course, had stopped before the time of my visit. The caterpillars had evidently become full-grown during the first and second weeks of July. Moths which had issued some days before the end of July were present in large numbers on the trees, and from fairly good examples collected, I saw that the species was *Tortrix fumiferana,* Clemens, which is known popularly as the Spruce Bud-worm. The caterpillars had fed chiefly at the tops of the trees, although some injury was done towards the ends of many of the lower branches. The foliage for about four or five feet from the tops of the infested trees was almost wholly destroyed, being either partly or completely eaten by the caterpillars. This, with the exposed pupal cases above referred to, gave the trees the conspicuous reddish appearance, and caused the rather widespread report among lumbermen that the trees were dying. In looking over a valley on the opposite hillside, the trees appeared as if fire had swept through the region. Other than loss of foliage and the consequent setback thus caused, the trees did not seem to be seriously injured. The tops were perfectly green under the bark.

The outbreak of the Spruce Bud-worm this year has been most remarkable and very widespread. Not only has this insect done much damage all through the Upper Gatineau country and other adjacent districts, where there are large tracts of spruce and balsam trees, but even in British Columbia reports have been received of much injury by the Tortrix. Dr. C. Gordon Hewitt, Dominion Entomologist, when in British Columbia, in October last, saw the conspicuous work of the insect and received reports from local entomologists concerning its ravages.

The Spruce Bud-worm, when mature, is nearly an inch in length, tapering slightly from the middle to the end. In colour it is dark brown and bears conspicuous whitish-yellow piliferous tubercles, and along the side of the body there is a yellowish stripe. The eggs of the insect are scale-like and are deposited in clusters overlapping each other. The partly grown caterpillars pass the winter among the terminal shoots of the trees, completing their growth the following year. The moth expands about 7-8 of an inch when the wings are spread. In colour it is dull gray, the fore wings overlaid with bands, streaks and spots of brown. In the middle of the upper margin of the front wings there is a rather large conspicuous whitish spot. In British Columbia, this year, the moths were of a distinct reddish colour, but all the eastern specimens noticed were of the gray form.

When an insect attacks forest trees, such as has been the case with the Spruce Bud-worm the past summer, it is, of course, impossible to do anything in the way of applying remedial treatment, such as is done for leaf-eating insects when attacking orchard or ornamental trees. Fortunately an outbreak of such a nature, however, is generally attended by natural parasites, which sooner or later restore the balance of nature. From observations made, and from parasites reared in

the Division of Entomology from material collected in the Baskatong District, we have reason to hope that the Spruce Bud-worm will not next year continue to any serious extent its work of destruction. Undoubtedly, too, birds will help materially to reduce the numbers of the hibernating caterpillars.

In the forthcoming annual report of the Division of Entomology of the Dominion Experimental Farms, covering the injurious insects of the year 1909, it is purposed to give a much fuller account of the injury done to spruce and balsam trees by the above insects not only in the Upper Gatineau country of the Province of Quebec, but also in British Columbia.

THE SNOW-WHITE LINDEN MOTH.

(*Ennomos Subsignarius, Hubn.*)

By A. F. Winn, Westmount, Que.

Poor as the summer of 1909 has been for most species of butterflies and moths in the neighborhood of Montreal, conditions must have been favourable for this White Geometrid Moth, for during August swarms of them about the electric lamps in our streets attracted the attention of many persons who do not usually take much heed of insects that do not sting them.

For at least twenty years, prior to 1908, the moth might well be considered a rarity and my captures of it in that period did not exceed an average of one specimen per annum, and these were all taken in the woods flying among linden, beech and maple trees. In 1908 there were great numbers of larvæ in June, in the woods at the eastern end of Montreal Island, feeding on the leaves of the trees above mentioned, as well as birch, completely stripping the lower branches of their leaves, the dropping of the frass on the leaves and ground sounding like the patter of a smart shower of rain.

I was out of town the last two weeks of July, during which time the principal part of the flight of the moths occurred, but scores of dead moths in store windows and spider webs, and broken-off wings in little heaps at base of electric light poles and in gutters, showed plainly that the flight must have been one of myriads. The Entomological Record for 1908 tells of the occurrence at Ottawa, July 23rd.: Dr. Felt's 24th Report records its abundance through New York State and Massachusetts, with figures of larvæ and pupæ and plate of eggs and imago; and Mr. W. H. Broadwell in the *Canadian Entomologist* (XL. 327) gives, under title of "A July Blizzard," an interesting account of the flight of swarms of moths at Newark, N.J. The last writer has again an article in the November number of our magazine mentioning that the 1909 crop of moths was even greater than that of the previous year. The same thing has occurred here and doubtless in many other places, and as Mr. Broadwell aptly remarks, it is "very unusual for an insect ordinarily rare to appear in great numbers for two succeeding seasons." If this insect's periods of visit in swarms are always separated by such a long term of years it cannot have many parasites peculiar to itself, or they would surely starve during all the lean years. Toads, bats, cats and sparrows undoubtedly had a sumptuous repast in the cities, but they have quite a choice of diet. It will be

interesting to note whether there are any of the moths next year; if not, we may have to leave future observations to our successors, as the astronomers do with the comets.

On the morning of August 2nd, on my return from a vacation, large numbers of the moths were seen clinging, with their wings closed over their backs, to the office buildings down town, particularly at, or near, the street corners where the arc lamps had evidently attracted them the previous night. The following day there were still some moths about town, and all taken and seen on both days were males.

On August 9th they were again plentiful at the lights during the evening—every lamp passed by in a three-mile walk had its swarm of white moths about it. An incandescent lamp on my gallery attracted many of them, the numbers increasing as it became later, and about 11 p.m. there were often between 20 and 30 flying around and the brick wall of the house was spotted all over with white.

On the 14th, the moths were again noticed down town, in good condition, on walls and windows of buildings and all were males so far as noticed.

On August 24th, after 10 days apparent freedom from them, they were again plentiful and in equally good condition. Evidently there had been a large flight to the lamps the previous evening. Dr. Bethune happened to be in Montreal in the evening of the 23rd and in crossing the city from the Windsor to the Place Viger Railway Station, observed and wondered at the great quantities of white moths around nearly every lamp, capturing some to make sure what they were and was surprised to find E. subsignarius swarming at so late a date—a full month later than in 1908. Among my captures on 24th August, was one female, the only one seen attracted to light among several thousands observed of the male sex.

On September 4th, a couple of females were found on tree trunks in Mt. Royal Park, but they were worn and nearly dead—too weak to lay any eggs. These were the last that I noticed alive. Wings and dead moths still adorn many corners and basement window sills that are not swept out so carefully as they might be.

The simultaneous appearance of unusual numbers of any insect always makes one suspect migration from distant warmer parts, where they have been drawn up into the upper air and carried along by the wind, certain numbers dropping off here and there, as is the case with such moths as the Cotton Moth (*Alabama argillacea*), Erebus odoratus and many of the Southern Sphingidæ. I am inclined to think that in this case all the insects were bred in the neighborhood, but it is difficult to account for their excessive abundance on certain nights and absence on others over such a long period unless certain weather conditions are necessary for the final transformation from pupa to moth, or that only under favourable conditions are the male moths inclined to visit the lights. A study of the McGill College Observatory report of the local weather for the month throws no light on the subject, neither temperature, humidity, direction, or velocity of the wind, nor rainfall appearing to show any relation to the flights; but of course, a west wind might bring the moths from a tract of woods lying west of the city on one evening, while an east or a north wind might have the same effect on other evenings on those bred in the respective directions. It is quite certain the swarms of moths seen in St. James Street did not breed within a mile radius of Montreal General Postoffice. It is a curious coincidence that our other species of Ennomos, E. magnarius, usually so plentiful in September, has been scarcely seen at all either in 1908 or 1909.

NOTES ON FRUIT TREE SCOLYTIDS.

By J. M. Swaine, Macdonald College, Que.

There are three species of scolytid beetles occasionally injurious in parts of this country to orchard trees. Two of them, *Eccoptogaster rugulosus,* Ratz., and *Phlœotribus liminaris,* Harris, have recently caused considerable uneasiness in certain fruit districts of Ontario, and the third, *Xyleborus dispar,* Fabr., has been a well-known pest of Nova Scotian apple orchards for some years.

Apparently these insects are not serious pests in Quebec Province. *X. dispar* is found here commonly in *Betula lutea* and other forest trees, but I have not yet taken it in Quebec from orchard trees. The first two species are at least rare in the Montreal district.

Inquiries have come to this Department recently for an easy method of separating these three forms, and the following notes are to that end.

The Shot-hole Borer, *Xyleborus dispar,* cuts round, black tunnels deep into the wood; in small branches or stems one division of the tunnels partially girdles

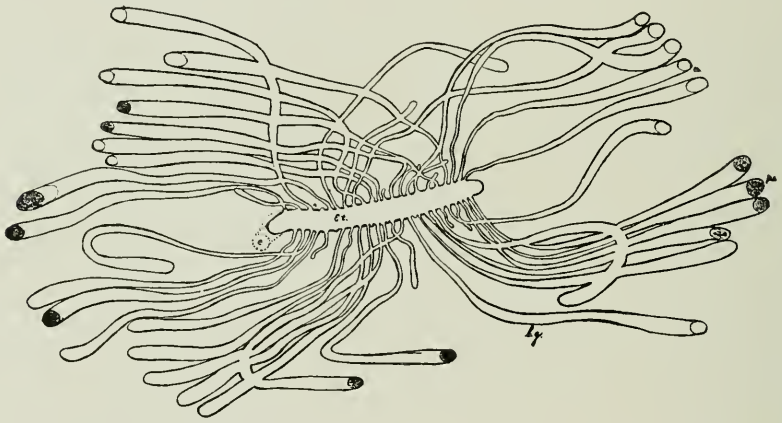


Fig. 1. Tunnels of E. rugulosus in peach: (*e*) entrance hole; (*e.t.*) egg tunnel cut by adult; (*l.g.*) larval gallery ending in *p.c.*—the pupal cell.

the wood. The eggs are laid free in the galleries early in June, and the larvæ feed upon the fungus which grows upon the tunnel walls, and gives the dark stain just referred to. The larvæ do not enlarge the tunnels, and emerge when matured, through the entrance hole cut by the mother insect. In the other two species each individual beetle, when ready to emerge, cuts a separate hole through the bark.

This species breeds in various forest trees and in fruit trees. Of the latter it apparently prefers the apple, and does harm chiefly to the young stock. The remedies aim to repel the tunnel-cutting females, which do the entire damage, or to destroy the food-fungus and the brood within the tunnels. Good results have been obtained in Nova Scotia from the use of a wash made of 3 gallons of water, 1 gallon of soft soap, and half a pint of crude carbolic acid. This wash is applied several times while the beetles are prevalent, the first application being made about the first of June. Badly infested trees should be burned, and those still of value may be treated with carbolic wash, and should receive good cultivation and plenty of fertilizer. Trees in good health are less liable to attack. Diseased

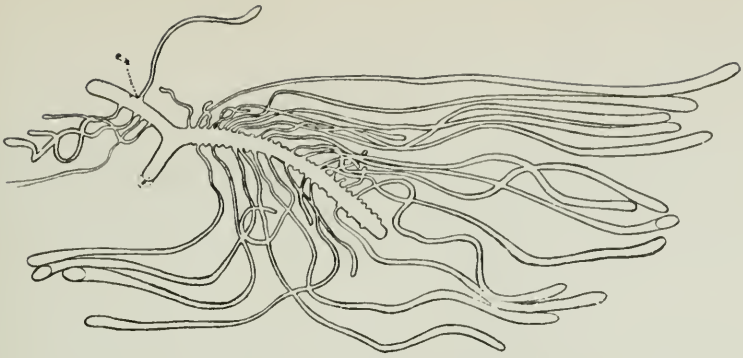


FIG. 2. Tunnels of P. liminaris: (*e.n.*) egg-niche.

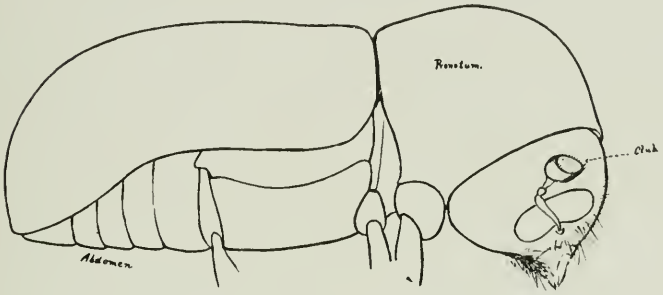


FIG. 3. Xyleborus dispar from the side, legs removed.

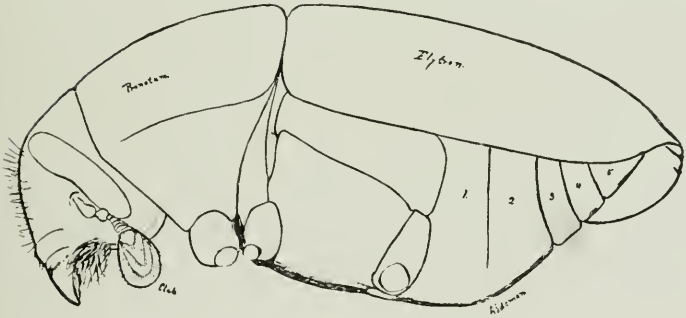


FIG. 4. Eccoptogaster rugulosus from the side, legs removed.

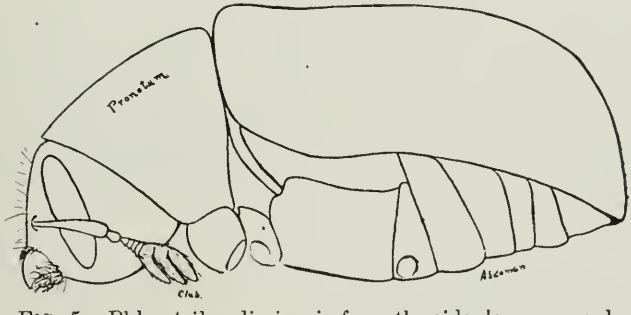


FIG. 5. Phloeotribus liminaris from the side, legs removed.

and dying branches should be removed and burned before the first of June. When fresh holes of this beetle are found in small trees, it is an easy matter to inject into the holes a little kerosene or other oil. The oil kills the insects which it wets, and destroys the food-fungus, with fatal results to the beetles and larvæ.

The adult female is black, cylindric, and about one-eighth of an inch in length. The pronotum is bent very strongly ventrad in front, so that the anterior opening is nearly horizontal. The head is globular and deeply sunk in the pronotum. The antennal club is sub-globular and truncate distally. The venter of the abdo-

FIG. 6.

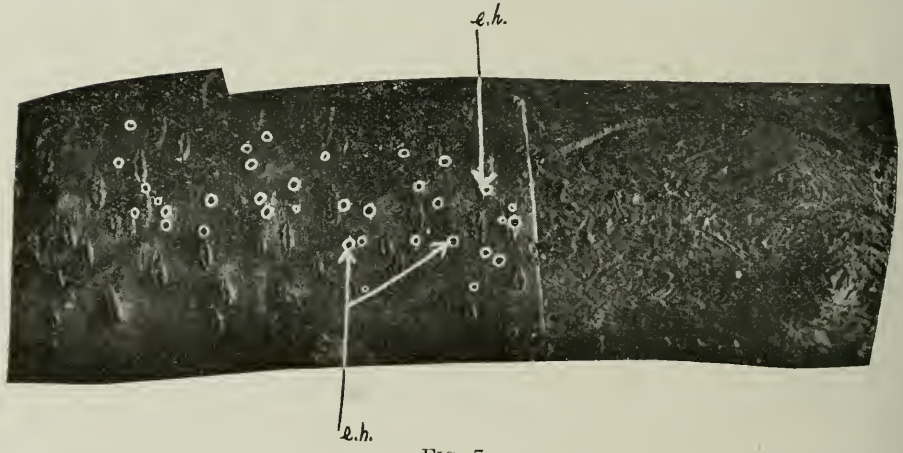
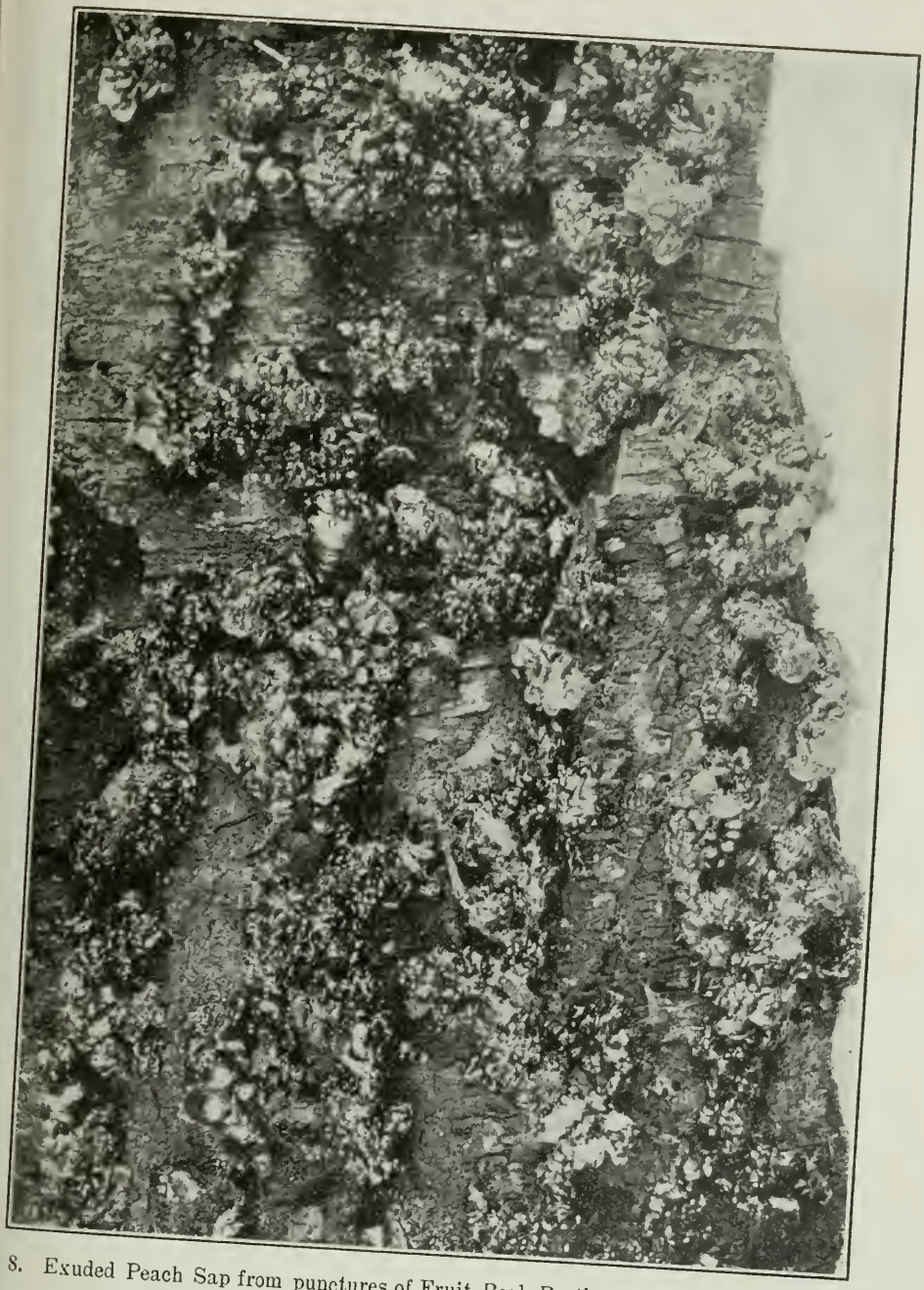


FIG. 7.

FIGS. 6 and 7. Work of E. rugulosus in apple; (*p.c.*) pupal cells sunk into the wood; (*e.h.*) exit holes of matured beetles. These holes lie usually immediately over the pupal cells. The smaller holes in figure 7 were cut by parasites.

men is evenly rounded. The truncate club and the strongly bent pronotum, as well as its larger size, distinguish it instantly from the other two. The males are much smaller than the females, wingless, and of a curious hump-backed shape.

The Peach-tree Bark-beetle, *Phloeotribus liminaris,* cuts all its tunnels between the bark and the wood. An egg-tunnel is cut by the adult and the eggs laid in niches along the sides. The larvæ bore away from the egg-tunnel, keeping between the bark and the wood, eventually following the grain of the wood, and pupate in the enlarged end of the larval galleries thus formed. Later they appear through holes cut in the bark above the pupal cells. The egg-tunnels of this species



G. 8. Exuded Peach Sap from punctures of Fruit Bark-Beetle, (after Lowe, N.Y. Agr. Exp. Sta., Bull. 180).

are distinguished from those of *rugulosus* by a short side-branch which forms, with the short tunnel leading to the opening in the bark, a Y-shaped end to the main division, (See Fig. 2). The adults are brownish-black, about one-tenth of an inch in length. The pronotum is not bent strongly ventrad in front, so that the anterior opening is oblique. The head is large and visible from above. The antennal club is lamellate, divided into three separated, laterally produced segments. The venter of the abdomen is not bent strongly dorsad behind.

The damage inflicted by this beetle is mainly to the cherry and peach. Trees in apparent good health are attacked in the fall by the hibernating adults, and from the short tunnels then cut much sap exudes during the following season. Healthy trees are also attacked by the adults during the egg-laying season, but the vigorous flow of sap invariably drives them away. The brood can be reared only in weakened and dying trees. Successive attacks, however, will so weaken a tree that eventually the egg-tunnels can be cut and the brood reared, the result of which is the utter destruction of the inner bark. Slightly injured trees from which the beetles have been driven by the flow of sap should be well fertilized and protected from further injury, by a repellant wash. All dead and dying limbs and trees should be removed and burned before the emergence of the contained brood. Seriously injured trees are improved by a severe pruning. Mr. H. F. Wilson recommends the use of thick whitewash as a repellant, to be applied before the attack of the borers (Bull. 68, part IX., U.S. Bureau of Entomology). Good results seem to have been obtained in Ontario with lime-sulphur wash and with "Sanders' Wash" applied to the trunk and bases of the branches early in spring, about the first week in March, and again in July before the second attack.

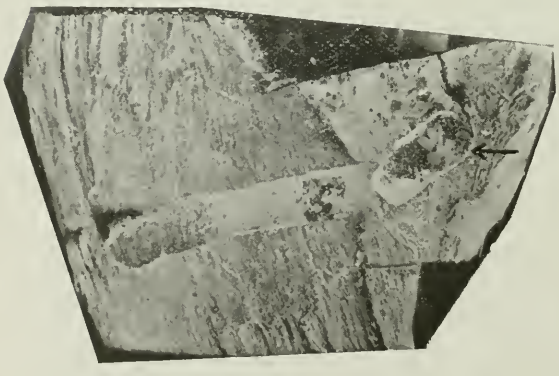


FIG. 9. Tunnels of Xyleborus in beech, arrow points to eggs.

FIG. 10. Tunnels of Xyleborus in beech, arrow points to female in characteristic position guarding the entrance.

The Fruit-tree Bark-beetle, *Eccoptogaster rugulosus*, Ratz., is of the size and general appearance of *P. liminaris;* but the venter of the abdomen is bent sharply dorsad beyond the first segment, and the antennal club is solid, flat and marked by strongly angulated sutures. The galleries of this species are entirely between the bark and the wood; the ends of the larval galleries, which form the pupal cells, are often sunk a few millimeters into the wood. This species agrees with *P. liminaris* in general habits. It breeds in dying limbs and trunks, but like

liminaris, injures living trees by driving short tunnels into the bark through which the sap flows copiously, later to harden and form the gummy masses which characterize the work of *P. liminaris* and *E. rugulosus* in healthy bark. This species attacks the apple, cherry and peach, and is often found working with *P. liminaris* in the same limb. The three washes mentioned above are also useful against this species

Clean culture is absolutely essential if these borers are to be controlled. Diseased and dying fruit trees furnish breeding grounds for these beetles and for numerous other insect pests, and should be burnt to prevent the spread of the insects beneath the bark and in the wood.

The following key will enable anyone to separate quite easily the three forms discussed. A hand-lens is needed for examining the antennæ, but the other characters are visible to the naked eye. The beetles are easily distinguished by their tunnels, as indicated by the diagrams.

A. Venter of the abdomen with the caudal portion bent abruptly dorsad. Antennal club flat and marked by angulated sutures. (Bark-borers) Eccoptogaster rugulosus (The Fruit-tree Bark-beetle).

AA. Venter of the abdomen normal, regularly curved.

B. Antennal club lamellate, of three separate, laterally produced segments. Head visible from above. (Bark-borers) Phlocotribus liminaris, Harris. (The Peach-tree Bark-beetle).

BB. Antennal club globular, truncate at the tip. Head deeply imbedded in the prothorax, the anterior margin of which is nearly horizontal, invisible from above. (Wood-borers, tunnels stained deep black). Xyleborus dispar, Fabr. (The Shot-hole Borer).

OBSERVATIONS ON ONTARIO INSECTS IN 1909.

By C. J. S. Bethune, Ontario Agricultural College, Guelph.

As Mr. Gibson and Mr. Caesar have already presented reports upon the insects of the season, it only remains for me to refer to some that have especially come under my observation, or that have been a source of trouble to many correspondents.

The weather during spring and early summer seemed peculiarly favourable to the multiplication of Plant-lice (Aphids). They were to be found in more than usual abundance swarming upon a great variety of trees, shrubs, and plants, and causing a great deal of injury by checking the growth and impairing the vitality of everything they attacked. Cabbage and turnip plants were affected by them early in the season, but they ceased in most cases to be much trouble later on, in marked contrast to last year when they were a very serious plague till the frost came and destroyed them. In the vegetable garden peas, potatoes and lettuce were especially attacked and in the flower borders roses, asters, hollyhocks, etc., and even ferns; currant bushes had their leaves covered with wart-like swellings beneath which swarms of aphids were huddled; plum and cherry trees showed signs of the intruders by the crinkled and twisted leaves at the ends of the branches enclosing multitudes of black lice; on the leaves of apple trees green aphids were abundant, while twigs were soft and foliage tender, but later on they migrated to more succulent plants, probably to the wheat fields. Many elm trees looked sadly out of sorts from shrivelled and distorted leaves covered with disgusting woolly

lice, which were to be seen also wherever a scar was to be found on trunk or limb; great colonies of open feeding woolly aphids were also frequent on hawthorns. A clump of European lindens on the College lawn were so beset with lice that the leaves looked as if varnished owing to the incessant dripping of tiny drops of "honey dew," the sweet excretion from the hosts above; happily a couple of days of heavy rain washed the foliage clean and checked the increase of the aphis army. A handsome copper-beech on a friend's lawn in Hamilton was alarmingly attacked by another woolly form (the so-called wool is really wax), and its owner feared that permanent injury would result. In other places, maples, birches and various shade and ornamental trees were beset with these minute foes, while on firs and spruce were to be found the giants of the race, great black aphids, a hundred times bigger than the familiar green plant lice, belonging to the genus Lachnus. Widespread and varied indeed were the enemy, but their own foes speedily came to the rescue; Lady-bird beetles, yellow and orange and black, were to be seen in great numbers, and their larvae also were busily engaged in devouring the sweet morsels. The quaint, spiny chrysalids, sticking by their tails to the bark of trees, and occurring in masses, even fifty or more huddled together, were often sent in by observers fearing that they might be a new foe, and well pleased to learn that the formidable creatures were veritable friends. Syrphus fly larvæ and those of Lace-winged flies, aided by various other aphid eaters, combined to reduce the swarms, and these with a change of weather conditions, stayed or entirely removed the plague; during the latter part of the summer complaints almost ceased to be made. The standard remedies for these insects that live by sucking the juices of plants are kerosene emulsion, tobacco wash or strong soap-suds, preferably that made with whale or fish-oil soap.

Besides the scale insects referred to by others, there has been a widespread attack made upon trees in northern parts of the city of Toronto by the elm-tree scale (*Gossyparia spuria*). Last year it only came under my observation from its occurrence on the elms in a single garden, but it must also have been established unnoticed upon many others to have become so abundant this year. It would probably yield to treatment with the lime-sulphur wash applied at the usual time in early spring, but city dwellers with small gardens and few trees have no spraying outfit nor would they like to make use of a remedy so disagreeable to those who handle it. In their case much may be done by clearing off the scales with a scrubbing brush dipped from time to time in strong soap-suds. Where the elm-trees in parks, on boulevards and the sides of streets are attacked it is certainly the duty of those employed by the city to have the affected trees properly and thoroughly treated. Any neglect now may result in a widespread loss of these beautiful trees which grow so luxuriantly and are so attractive in and around Toronto.

The Cottony Maple Scale (*Pulvinaria innumerabilis*) which is essentially a town insect, attacking many other shade trees beside the maple, and when at its height spreading to plants of almost all kinds in parks and gardens, has been noticeable in several places this year. Like several other injurious insects it has its cycles of abundance and scarcity; increasing in numbers for some years and becoming a veritable plague, and then rapidly diminishing till it ceases to be noticed. This change is due, no doubt, to the attack of parasites combined with unfavorable climatic conditions. Repeated sprayings with kerosene emulsion when the lice are hatching out from the eggs contained in a waxy, cotton-like mass would keep the insect in check, and should be resorted to as soon as the scale is observed on the trees.

The oak trees in the neighborhood of the town of Galt have been stripped of their foliage both this year and last by the caterpillars of the Senatorial Moth (*Anisota senatoria*); the attack has been going on for four years and must result in serious injury to the trees if nature's checks do not soon come to the rescue. The caterpillars, when full-grown—which they were after the middle of September—are black with four ochre-yellow stripes along the back and two on each side. On each segment of the body there are six black spines or prickles, and behind the head two long slender horns projecting out on either side. The caterpillars feed together in great swarms, several hundred on a branch, and devour the foliage, beginning at the end of the twigs and moving downwards till they have completely stripped off all the leaves; then they move on to another limb. When at rest they huddle together in masses and if disturbed raise the fore part of the body and shake their heads in a threatening manner. They make no webs or cocoons, but descend into the ground to pupate and remain buried in the soil till the following June; the chrysalids then work their way to the surface and the moths emerge to lay their eggs and provide for a new generation. The eggs are laid in large clusters on the underside of oak leaves near the tips of the branches and the young caterpillars are hatched during the month of August. The moths are handsome creatures, ochre-yellow in colour with a shading of reddish-purple on the front and hind margins of the wings; an oblique narrow purple-brown band crosses the wings, and near the middle of each there is a conspicuous round white spot. The male moth is much smaller than the female and more tinged with purple, the expanded wings measuring about an inch and three-quarters; the female moth is fully two and a half inches in expanse, and often is entirely yellowish with no tinge of red or purple.

During the height of summer and throughout the autumn season numerous complaints have come in from many parts of the Province respecting White-grubs and Wireworms. The former have been more than usually abundant this year and have caused a great deal of loss by their attacks upon the roots of corn, grain of various kinds, strawberries, etc. The most remarkable and uncommon attack has been upon the tubers of potatoes, in which they have bored great holes and rendered them unfit for marketing or table use. Generally they feed upon the fibrous roots, but this year their numbers were so great that after consuming these the only food for them was the potato itself. As I have stated in the *Ontario Crop Bulletin* for November: "White grubs are the larvæ of what are familiarly known as May beetles or June bugs. They breed for the most part in old pastures and require three years to attain to maturity. Crops that are planted when an infested field has been broken up are usually attacked by these grubs. During the first year they feed to some extent upon the remains of the sod that has been turned under, but during the second year, there being nothing else, they attack the roots of whatever crop there may be. The best remedy for them is a short rotation of crops, so that there will be no time allowed for their attaining maturity. An infested field may be fairly cleared of them by permitting hogs to roam about; they will root the grubs up and eagerly devour them. Late plowing is desirable in order to break up their winter quarters and expose them to the weather and their various enemies. Working underground as they do, it is not practicable to apply any poisonous remedies. Dependence must be placed upon the methods referred to."

Wireworms, the larvæ of Click-beetles (Elateridæ), have a somewhat similar life-history to that of the White Grubs, except that the beetles pass the winter under the shelter of rubbish, tufts of grass, etc., and appear during the first warm

days of spring, whereas the May-beetles, the adult form of White Grubs, remain buried in the ground during the winter and come out in May or June. Complaints of injury to the roots of many plants by the attacks of Wireworms have been received from various quarters, in fact never a year goes by without much loss from their depredations. The methods referred to above for the control of White Grubs seem to be the only effective remedies for Wireworms also.

GRASSHOPPERS, which have already been referred to by Mr. Gibson, were extremely abundant and destructive this year, attacking oats and other cereals, and injuring vegetation of almost all kinds. In this case, also, old pasture fields, where the soil is dry and sandy, are the favorite breeding grounds, and hot, dry weather the most suitable for their growth and increase. The worst attacks were reported from the counties around the Georgian Bay. At the beginning of August Mr. Cecil Swale, Secretary of the North Bruce Farmers' Institute, Wiarton, wrote as follows respecting the Grasshopper plague:

"We have had these pests for four years in succession, each year worse than the preceding one. This year, I can go to farmers who off, say, 30 acres, have only got a load of fodder, counting hay, grain and everything. Many cut their oats three weeks ago to save what was left. I know fields to-day that are just standing oat stubs, the grain all on the ground. Nobody can quite credit the destruction they can do and are doing; you have to see for yourself. These pests breed in old pastures, roadsides and old meadows. Lots of these pastures cannot be plowed for rock, while being well adapted to this particular use. Then, again, you may have a first-class farm, and your neighbour has fifty acres of pasture alongside; the hoppers cross over and eat you out. You have no remedy. I have a pasture farm divided from the main farm by 100-acre swamp. I have not many hoppers, as all the home farm is pretty much under cultivation; but my neighbour on the other side of the pasture farm has been cleaned out by the hoppers off my pasture. My cattle have been starved off the fifty acres of pasture, and I have taken them up into my hardwood bush. My neighbour has not two loads of anything off a forty-acre clearance. Oats and barley and grass are their chief food. Peas they seldom touch.

"We have been thinking a few experiments might be tried to destroy the eggs of the grasshoppers in the fall, such as lime, salt, or a mixture of both, used as a top dressing on pastures. Possibly a spraying of formalin and water might destroy those now living. The eggs are laid in September by the grasshoppers depositing them in small bunches of twenty or thirty eggs stuck together just below the surface. Skunks dig up great quantities of them in October. I opened a number of grasshoppers yesterday that seemed very large. Nine out of ten were filled with thread-worms, white, six inches long, which would seem to point out a possibility of the brutes dying soon. They are also infested with a bright red parasite. There are thousands of dead ones all over the meadows, but there would be no room for the living if some of them did not die. Naturally dry weather favours their increase, and as the last three summers have been dry we have had an extra hard crack from them. Matters are so serious with the farmers of the townships of Albemarle, Amabel and Keppel (in Grey) that I know many farmers will leave their farms, and many more would go if they could. We all thought last year would be the last of them, but the contrary was the case. Nobody cares to venture an opinion about next year now.

"As the grasshopper dies in the fall, the remedy appears to lie in getting after the eggs. The Criddle mixture, as recommended by one of the bulletins, does not work here; they won't eat it. They don't seem to eat anything which has been dosed with Paris green. I am sure the careful consideration of this matter will be most acceptable to all of us who are unfortunate enough to live in this district."

The Criddle mixture has been so often tried and found effective on a large scale in Manitoba and in many places in Ontario, that we are surprised to learn of its failure in this case. Mr. Criddle himself states that many applications of the mixture have been made this year and that it has proved entirely effective. It may be that some error was made in its preparation or mode of distribution.

The white worms found inside the bodies of some Grasshoppers are commonly called "Hair-snakes" (Gordius) and are well-known parasites of both crickets and grasshoppers. They evidently destroy large numbers, but amongst such hosts as above described, it would require an enormous army of the worms to

appreciably reduce the swarms. Scarlet mites, the red parasites referred to, are also commonly to be found clinging to their hosts and helping to destroy them. The destruction of the egg masses by breaking up the soil in which they are laid is by far the best method of getting permanently rid of the pests.

INJURIOUS INSECTS OF QUEBEC, 1909.

By William Lochhead, Macdonald College, Que.

The season of 1909 was in many respects abnormal. Spring was tardy throughout the Province and the crops were sown later than usual, on account of the cold rains. Summer weather conditions also differed in different parts. On the Island of Montreal there were timely showers throughout the summer, so that the crops at no time suffered from drought. Over a large part of the Eastern Townships, however, little or no rain fell during June, July and August, and the late sown crops suffered from lack of water. In the latter part of August rains fell which interfered with and delayed the harvesting of the crops. The autumn has been unusually free from frost. Very few of the outside flowers were nipped by the frost until the 20th of October.

Orchard Pests.

Orchards in Quebec are not well looked after as a rule. The majority of them are not pruned regularly, and as a result, the trees have too many twigs and branches, and the excessive foliage does not allow of the proper access of sunlight. Such conditions are congenial for the development of Apple Scab and the Brown Rot of Plums. Spraying is a practice indulged in by but few, and these are the up-to-date fruit growers, usually active members of the Quebec Pomological Society, who make money out of their Fameuse and St. Lawrence apples.

Cultivation of the orchard is sadly neglected, consequently there is ample opportunity for the safe hibernation of the more injurious insects, such as the curculio and the codling moth.

The Codling Moth.—This is undoubtedly the worst insect pest of the apple. It causes an enormous loss in orchards over the entire Province, and one sees no hope of abatement until the people learn to take better care of their orchards; by pruning, spraying, cultivation and destruction of the rubbish. Much good could be done if practical demonstrations were carried on by the Government to show how and when to spray and the value of spraying. I believe the time is fast approaching when the people will be ready to profit greatly by such demonstrations, for Quebec is well adapted climatically for the growing of apples of superior quality. Its Fameuse apple is known most favourably in all the great markets.

In spite of all that has been written, the life-history of the codling moth is not well enough known to the average farmer and fruit-grower. We entomologists must keep hammering away year after year until the fruit-grower can fight this enemy successfully by taking advantage of the weak spots in its life-history.

In Southern Quebec, including the border counties, there is in all probability a partial second brood; and it is the worms of this second brood that produce the wormy apples late in the season. The fruit may be entered at any point, and often an ugly scar is made on the surface, by the larvæ. A thorough

spraying with lead arsenate just as the petals have fallen, and another application ten days or two weeks later should kill the great majority of the first brood. To intercept the larvæ that escape these two treatments it would be advisable to apply a burlap bandage about the trunk in late June. The worms in escaping from the fruit find the burlap a convenient place to hide and to spin cocoons. To prevent the small portions that pass through a partial brood from doing injury the burlaps should be removed every ten days, and replaced after all larvæ and cocoons have been destroyed.

The Bud Moth. This enemy of the apple was quite prevalent about Abbotsford, and perhaps in other localities.

The Oyster-shell Scale or Bark Louse. As one would naturally expect, Oyster-shell Scale is quite prevalent in the apple orchards of Quebec. This insect may be looked upon as the enemy of half-tended and neglected orchards. It is not a difficult insect to control, yet it does annually a great amount of damage. Many owners of orchards when asked if the Oyster-shell Scale is present in their orchard will state that they are not acquainted with it. They have not yet come to recognize it as an insect and as a serious enemy. The insect passes the winter in the egg state under the gray-brown, oyster-shaped scales on the bark of the twigs and branches. The eggs hatch early in June; the yellowish lice crawl about for a few days and then settle and secrete a scale over themselves. There is but one brood each season.

An application of whitewash to the trunk and large branches during the winter will remove the scales and leave the branches clean in the spring.

The Apple Aphis. This insect was reported as abundant about Abbotsford, and in the Montmagny and Kamouraska districts below Quebec. It was observed on some of the trees in the young orchard at Macdonald College.

The American Tent Caterpillar. This insect, which was so abundant and injurious a few years ago, was again in evidence in many localities. It would be advisable for farmers to be on the look-out for the ring-like clusters of egg masses which encircle the twigs of apple and other trees during the fall and winter months, and to destroy them.

The Plum Curculio. Curculios were very prevalent in Quebec orchards in 1909. In some orchards a large percentage of the apples were deformed by the numerous curculio punctures, and were rendered practically useless. This widespread injury to the apple crop demands attention; this note is written with this purpose in view, and at the same time to outline concisely our knowledge of the habits of this most destructive insect enemy of plums and apples, and the best remedies that are being used elsewhere to control it.

At the outset it may be said that this pest is no new enemy. For many years it has given more or less trouble to orchardists, making itself more conspicuous by its injuries some years than others.

There are probably two species of curculios that are responsible for the injury in our orchards. The *Plum Curculio* (Conotrachelus nenuphar, Herbst) and the *Apple Curculio* (Anthonomus quadrigibbus, Say). It is believed, however, that the former does the greater amount of injury, although no careful observations have been made in Quebec to determine their relative abundance.

The Plum Curculio is a native of America, and fed originally upon the wild plum, wild crab-apple, and the hawthorn. With the advent of the cultivated apple it took readily to the new fruit, which it continues to infest.

Life History. The adult curculio beetles winter over in rubbish on the ground, under bark and elsewhere, and emerge from their hiding places about the time the plums and apples are in blossom. The eggs are deposited within punctures partially surrounded by a crescent-shaped slit in the newly-formed apples and plums. The eggs hatch in less than a week and the larvæ proceed to make channels in the fruit. Infested fruit soon falls, and in about three weeks the mature larvæ emerge and enter the ground. There they pupate, and in about four weeks emerge as beetles. These soon fly to the fruit and continue feeding upon it, until the fruit is picked from the trees, marking it with the characteristic cylindrical punctures. As winter advances they hide themselves under rubbish and bark to hibernate until spring.

The adults that emerge in summer deposit no eggs, *all* the eggs being laid by the over-wintering beetles. The injury to apples is done mostly by the beetles that mature in summer, as they make deep punctures when they feed upon the fruit.

It is rather a strange thing that curculio larvæ develop only in small apples, and will not reach their development unless the apple has fallen.

A single mother curculio may deposit between 200 and 300 eggs, extending over a period of three months, hence is capable of doing a great deal of injury. This great egg-laying and puncturing power of the beetles explain the greatly distorted condition of many of the apples observed this year at Brome, Abbotsford, and elsewhere. In the great majority of apples examined there were as many feeding-punctures as egg-punctures. Not in every case did the eggs develop when deposited within the crescent-shaped mark, for we found many apples that showed the crescent slit but had no trace of larvæ.

Treatment. Observations made in Illinois and elsewhere show that uncultivated orchards suffer most from curculios, and our Quebec orchard conditions would favor drawing the same conclusion. And such is what we might naturally expect, for the conditions of the uncultivated orchard, with the excessive amount of grass and weeds and rubbish, and the absence of pruning, furnish ideal conditions for the development of the curculio. Besides, the proximity of neglected orchards is a menace to clean orchards.

There are four ways of treating the curculio:

1. *The destruction of fallen fruit,* so as to kill the larvæ before they make their escape into the ground. The *early small* apples should be specially looked after in June and July, for these contain a large percentage of the larvæ. The later and larger fallen fruit do not, as a rule, contain many larvæ.

The presence of hogs in an orchard is strongly recommended, if no other means can be found to clean up and destroy the fallen fruit.

2. *Suitable cultivation,* so as to destroy many of the larvæ and pupæ in the soil. It has been found that the larvæ and pupæ are extremely sensitive to physical disturbances of any kind, as well as to light and air. Cultivation permits their exposure, for a short time at least, to sunlight and to the attacks of their enemies, birds, ants, and predaceous insects. As a rule, orchardists prefer to cultivate up to the middle of July, but where curculios are doing much harm this cultivation should be continued for a month longer, in order to do effective work to the larvæ and pupæ in the soil.

3. *Spraying with Paris Green or Arsenate of Lead,* to destroy the adult beetles. This treatment has not given good results, and it is doubtful if the practice warrants the trouble and expense.

4. *Jarring the trees,* to collect the beetles that fall on sheets under the trees. This method also is slow, and it is doubtful if the practice warrants the trouble and expense, save with young apple trees and with plums and cherries.

Farm Crop Insects.

Grasshoppers and Blister Beetles. Grasshoppers and Blister Beetles appeared in alarming numbers in August and September in many districts of the Eastern Townships. The former swarmed in oat fields and the latter in clover and mangel fields, and considerable loss was incurred.

The increasing amount of permanent pasture land in Quebec furnishes undisturbed breeding grounds for grasshoppers. The eggs are laid in masses below the surface of the sod in late summer and early fall, and hatch the following spring. As a rule, the young grasshoppers are not numerous, and confine their attention to the pasture lands, but should conditions at any time favor their multiplication they spread to the adjacent grain fields where food is more plentiful. It has often been observed that grasshoppers are seldom abundant two years in succession. The reason for this is that their very great abundance allows their numerous enemies to multiply very rapidly. Among those enemies are:

(1) *Parasitic mites,* bright red creatures often seen at the bases of the wings, which not only suck the blood of their hosts, but also later destroy the egg masses.

(2) *Hair-worms,* which live within the bodies of the grasshoppers and destroy large numbers.

(3) *Tachina flies,* whose maggots live within the bodies of the grasshoppers.

(4) The young of *Blister beetles,* which devour the egg-masses in the ground.

(5) *Fungous diseases* that often spread with great rapidity.

It is quite probable, therefore, that grasshoppers will not be much in evidence next year, and that there will be a rest from their ravages for a few years.

It is possible to guard against such losses as have occurred this year, by watching the pasture lands, and if grasshoppers are very numerous, it would be advisable to make applications of poisoned bait in the pastures, if it is safe to do so, along the edges of adjacent grain fields. This poisoned bait may be made by mixing 1 pound of Paris green in 50 pounds of bran, made into a mash with water and sweetened with cheap molasses. This is distributed in handfuls to infested areas. In Manitoba a bait known as the Criddle Mixture is used with great success. It is made by mixing 1 part Paris green, 2 parts salt, and 100 parts of horse manure. Enough water is added to make a soft, not sloppy, mash. The mash is scattered over the field where the grasshoppers are thickest.

Black Blister Beetles, called by the farmers "Blue Beetles," were quite destructive this year on clover, mangels and beets.

They are often found feeding on other plants, such as the golden-rod, aster, pigweed, corn, beans and potatoes, and in the days before the arrival of the Colorado Beetle, this and allied species were the main insect enemies of the potato crop.

The adults are soft-bodied, with long, slender legs. They occur from August to October. The females deposit their eggs in the ground, and from these hatch out active, long-legged larvæ called "triungulius," that feed on the eggs of the grasshopper.

It will be observed, therefore, that while the adult Blister Beetles are injurious to some of our crops the young of these are decidedly beneficial. It is a

difficult matter to decide sometimes whether it is advantageous to poison the adults, for if this is done there will be no larvæ to devour grasshopper eggs.

Should the adults become sufficiently injurious to warrant action, applications of Paris Green or arsenate of lead will readily kill them. On account of the abundance of grasshoppers this year, we may expect a large number of blister beetles next year.

Wireworms and White Grubs.

Among the list of injurious insects of farm crops, none perhaps surpass Wireworms and White Grubs, in the amount of damage inflicted. They work away unseen underneath the soil, and on this account are unknown to the casual observer. They are peculiarly the enemies of the careless farmer, and their presence indicates that something has not been done properly and at the right time. It may be that the pastures and meadows have been allowed to remain down too long; that a suitable rotation of crops is not practised; or that there is little or no fall plowing done.

Wireworms are the grubs of click-beetles or "skipjacks," and White Grubs are the grubs of June beetles, with which most persons are quite familiar.

Wireworms. The adult beetles appear frequently in the spring and the females deposit their eggs close to the roots of grasses or weeds. The Wireworms, however, do not confine their attacks to the roots of grasses and cereals, but often devour the roots of other crops and even the seeds of corn, wheat and other grains. In fact there is no plant that is immune from their attacks, so far as we know, although many farmers in England claim that buckwheat, mustard and rape escape. The Wireworms, of which there are many species, are hard, smooth, shining, yellowish-brown, wire-like grubs, and possess three pairs of short legs, hence they are readily identified.

Many attempts have been made to devise some reliable method of destroying them. Some years ago Professors Comstock and Slingerland, of the Cornell Agricultural Experiment Station, and Professor Forbes, of the Illinois Station, conducted a very complete series of experiments extending over a number of years, and found that insecticides were practically of no value. They ascertained, however, that certain cultural operations were valuable in destroying large numbers of the transforming pupæ and adults before they emerged from the cells in the ground. Wireworms spend from three to five years in the ground and transform to pupæ and adults in the late summer and autumn. But the adults remain in the pupal cells, and do not emerge until the following spring. It was determined that these pupæ and adults wintering in the pupal cells were very sensitive to distributions such as late plowing produces. Plowing infested or suspected sod-land twice—once in August, with a good harrowing a week later, and again in late September or October—will break up many of the pupal cells and expose the beetles during the winter to conditions which they cannot survive.

This cultural process will not interfere with the Wireworms or those in the grub stage. When a sod-land is broken there will naturally be Wireworms in different stages of development, some in the first year larval stage, some in the second year, and some in the third year, and others ready to pupate. Only those ready to pupate will in all likelihood be killed by the fall plowing. In the following season, however, the young grubs are growing rapidly; and if the dying roots of the sod furnish sufficient plant food, they will not do much feeding on the roots of the new crop, but will be more injurious the year following. Now certain crops, such as clover, barley, wheat and rye, are not so liable to attack as are corn,

potatoes, mangels, oats; hence, they are better adapted to follow sod. Clover can be sown with barley and rye and plowed down after a cutting has been taken. This may be followed by corn or roots. Such a rotation will gradually exterminate the Wireworms, and furnish crops that give a good yield.

Short crop rotations will never allow Wireworms or White Grubs to make headway and develop, for there is too much disturbance of the soil and change of food plant. The best method of breeding these insects is to allow pastures to go unbroken for a series of years, for then conditions are particularly favourable for their development.

Sometimes it is possible to force the crops through an attack of Wireworms, by the application of mineral fertilizers to stimulate the plants.

White Grubs. White Grubs, as already stated, are the larvæ of June beetles, and are large, soft, whitish or yellowish grubs, with brown heads and three pairs of legs. The bodies are larger towards the hind end, and usually appear half-coiled. Like the Wireworms they require about three years to complete their development from egg to beetle. The adults appear in May and June, often in large numbers, to feed on the foliage of certain trees, such as plums, willows, etc., and to deposit eggs below the surface of the ground, usually on the roots of grasses and many other kinds of plants. The grubs on hatching begin to feed on the roots, and often do considerable damage. Dr. Forbes, of Illinois, who has given a great deal of study to White Grubs, is of the opinion that the grubs do not change to pupæ until June or July of the third season; that they change to beetles a few weeks later, but that these do not emerge from the pupal cells until the following spring. He is also able to identify several distinct species of Lachnosterna, of which *fusca* is the most common.

As with Wireworms, remedial measures are difficult. Special rotations are advisable. Fletcher says: "A short rotation in which clover follows grass or is grown at short intervals, will prevent the increase of these insects. In this special rotation the small grains should follow clover before corn or potatoes." When a field becomes infested with White Grubs a portion of the clover field, for example, might be broken and planted to corn instead of planting corn after timothy or grass. To make up for the deficiency of clover, that portion of the sod field which would have been devoted to corn could be sown with oats, vetches, etc., for green feed and hay. It is perfectly safe to put mangels, turnips and rape after old sod, although one will have to be on the guard against cutworms nipping off the young plants.

Cutworms and Flea-beetles. Considerable damage was done in June by cutworms on turnips, carrots and mangels, before they were detected, but the application of poisoned bait prevented further action.

In the Experimental Plots at Macdonald College the Wheat Aphis and the Wheat-Stem Maggot again made their appearance, but not in such numbers as in 1908. Flea-beetles were observed on some plots but they did no serious damage.

Root Maggots. These were numerous on many kinds of plants, viz., radish, cow-peas, soy beans, cabbage, onions and turnips, and caused considerable loss.

Cucumber Beetles. These appeared about June 10th at Macdonald College, and did more harm to squash than to cucumber, pumpkin or melon. Mr. Swaine reports that Bordeaux Mixture seemed effective, but they return to the new leaves and flowers.

Leaf Miners. Beets and spinach at Macdonald College were injured by leaf-miners. They attacked small leaves, and had practically disappeared by July 4th.

Currant Borer. (*Sesia tipuliformis, L.*). Mr. Swaine reported considerable injury to stems of both black and red currants. In some cases the stems were dying, and the leaves dried and discoloured. The larva bores in the pith sometimes for over six inches; it remains in the wood all winter, and in the following summer, in June, the bluish-black fly-like moth emerges to lay her eggs at the buds on the young wood.

Gooseberry Span-worm. (*Cymatophora ribearia,* Fitch). The moths were observed July 24th, not only on the gooseberries, but also on the currants, in the Macdonald College plantation. They fly readily in day-time when disturbed, and are attracted to light at night.

The larvæ or caterpillars are to be found in June; they are white, dotted with black, with yellow stripes about an inch in length when full grown. There is but one brood in a year; the eggs are deposited in July on the twigs, where they remain all winter.

This insect is capable of doing considerable injury to the leaves of gooseberry and currant. Arsenate of lead will control it.

Currant Aphis. (*Myzus ribis, L.*). The reddish blisters on the leaves of currants—the work of the currant aphis—were much in evidence in many Quebec plantations this past season. Inasmuch as the deformations interfered with the proper functioning of the leaves, considerable injury was undoubtedly done. Careful examination for the presence of aphids on the young leaves should be made, for it is much easier to kill the insects when they are few in number and before the leaves have become deformed, by applications of whale oil soap or kerosene emulsion solutions.

The Carrot Rust Fly. (*Psila rosæ*). This insect did considerable damage in some of the truck gardens about Montreal. Mr. Swaine received on July 14th, from McKinnon & Son, a package of small carrots which were riddled by the maggots of this insect.

The Fall Web-worm. The unsightly webs of the Fall Web-worm were very abundant both on forest, shade and fruit trees throughout the Province. Mr. J. M. Fisk, of Abbotsford, reports it as prevalent in his district, and Rev. Brother Liguori states that it was abundant at La Trappe.

ANISOTA VIRGINIENSIS, DRURY.

By Thomas W. Fyles, D.C.L.

Anisota virginiensis is one of the insects injurious to the oak. In some years its ravages are very apparent. I have succeeded this year (1909) in bringing its larvæ through their successive stages.

I had tried, on several previous occasions, to raise the species, but had failed. I attribute the failures to the fact that oak-spray, severed from the tree, dries very rapidly; and, as there were no oaks growing near my former residence, I could not keep the larvæ supplied with sufficiently tender food.

In my present place of abode I am better situated, as the White Oak, *Quercus alba,* is common in the neighbourhood. I have taken the precaution too, of placing every fresh supply of food for the Anisota under the water-tap, and drenching it thoroughly, before placing it in my insect breeding-cage. This plan has proved very successful.

A. virginiensis is widely distributed in the Province of Quebec. Mr. A. R. M. Boulton, President of the Quebec Branch of the Entomological Society has two specimens (♂ & ♀)that were taken, I believe, at Cape Tourment in Montmorency County. I have frequently met with larvæ of the kind on the Island of Orleans, and, on the 16th of last June, I found a beautiful male moth of the species, lying under an arc-light, near some oak trees, on Front Street, Hull. On the 29th of the same month, Miss M. G. Johnson, a member of the Entomological Society, sent me from Miranda, Missisquoi County, some oak-leaves laden with the eggs of the species, and also one of the moths that she had found laying the eggs, and a male of the same species.

The eggs lay close together, in broad patches which in several instances covered the under-side of the leaf—none were laid on the upper side. They were of a roseate light brown tint, but here and there was a pale green egg seemingly unfertilized.

The egg of *A. virginiensis* is globular in shape; but as the larva within advances in growth it becomes depressed, and loses its roseate tinge, till at length the little black-headed larva, snugly coiled, is plainly visible within the shell. The egg is one-twenty-fourth of an inch in diameter.

Doubtless the eggs sent me were deposited by several females of the same kind, and at slightly different intervals, for they hatched irregularly. The first of the young larvæ to appear left the shell the day after the eggs reached me—*i.e.,* on June 30th, and the others appeared at intervals for the next fortnight—consequently, some of them had reached the third stage while others were only in the first. In these notes I have followed the larvæ first hatched.

The newly-hatched larva was one-eighth of an inch in length. Its head was large in proportion to its body, and jet black. The mouth-organs were yellow. The body was yellow, and set with short spines. The legs were pale yellow and semi-translucent.

The larvæ are gregarious. They eat away the substance of the leaf, leaving only the mid-rib and some of the larger veins. When they have finished with one leaf, they proceed to another on the same twig, and, having stript it, they advance to a third, and so on—moving from leaf to leaf and from twig to twig.

The first moult took place on the 6th of July. After it the larva was a quarter of an inch long. Its head and fore-legs were black; its body was pale yellow; it had on the third segment two seven-jointed black horns. Along the middle of each of the following segments on the upper side was a row of small warts—each wart bearing a short bristle. A few white hairs extended from the black head. Towards the end of this stage in the larva's existence the segments of the body became more distinct and assumed a bluish green tint, with slightly darker longitudinal stripes.

The larva moulted again on the 14th of July. The old skin broke at the head to allow the larva to escape from it. When it made its fresh appearance the head, horns, anal segment and fore-legs of the larva were green, but they soon changed to black.

The body colour in this stage was sage green, with yellow sub-dorsal, side, and spiracular lines. There were several black, pointed tubercles along the middle of each segment, on the upper side. The spiracles were black. The black, glossy horns on the third segment extended beyond the head. There was a black granulated plate on the second segment, and before the horns on the third.

The larvæ again moulted on the 23rd of July. Their vacated skins were left in rows adhering to the mid-ribs of the leaves which they had skeletonized. Their body colour was now black. As in the previous moult the head, etc., were green at first, but soon changed to black. The whole body was firm and glossy. There was a double line of yellow along the back; and the sub-dorsal, side, and spiracular lines were yellow. There was a row of spike-like protuberances around the segments on the upper side—on the anal segment there was a cluster of such protuberances. In this stage the larvæ attained a length of one and one-sixth inches.

They moulted again on August the 4th. Their length after the moult was one inch and five-twelfths of an inch.

The larvæ reached their full growth by the second week in August. They were then two and a quarter inches long, cylindrical, glossy black with very conspicuous yellow lines. The spiracles were black. There was an oblong yellow spot over each of the prop-legs and a similar spot on either side of following segments. The thorny protuberances on the segments were well developed, and at the end of the body there was a cluster of such protuberances.

The larvæ began to enter the soil on the 10th of August; and before the end of it, all in my keeping had buried themselves; but, so late as the 13th of September, I found in the woods a solitary straggler of the species.

The pupa is finely sculptured. Its abdominal segments are boldly outlined; and from the last of them projects a stout spine forked at the end. This probably serves as a lever, to enable the chrysalis to work its way to the surface of the earth, when the imago within it is nearing perfection.

In rearing the larvæ of *A. virginiensis* two particulars drew my attention specially. One was that, in the later stages of their growth, some of the caterpillars were *much smaller* than the others. In the final stage the smaller ones were only two-thirds the size of the larger. I should say that these were the undeveloped males, for the male moths of the species *are much smaller* than the females.

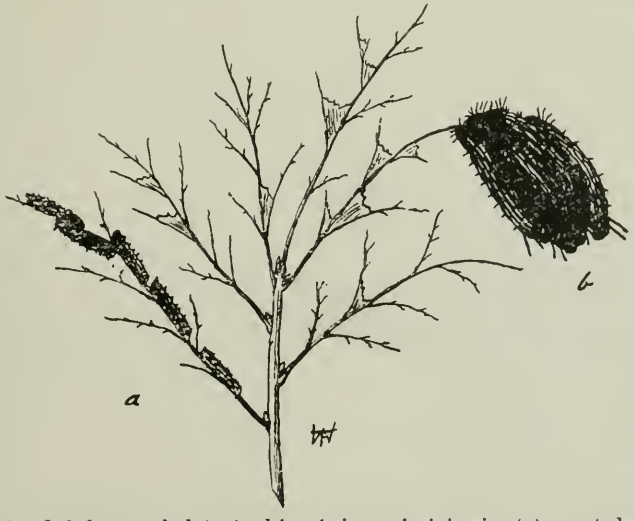


FIG. 11. Oak leaves skeletonized by *Anisota virginiensis*: (*a*) vacated skins of larvæ; (*b*) Larvæ bunched together for mutual protection.

The other particular was, that the larvæ in their later stages, had the habit of grouping themselves into clusters at the ends of the mid-ribs of the leaves which they had skeletonized. In these positions they somewhat resembled the small webs, that, in August, are so frequently to be seen on forest trees. (Fig. 11).

ADAPTATIONS IN THE STRUCTURE OF INSECTS.

By Rev. Thomas W. Fyles, D.C.L.

On a certain occasion last summer, a friend of mine was standing on a bridge, which spanned a shallow creek that had a muddy bottom. His attention was taken by the proceedings of a large dragon-fly that was hovering close to the surface of the sluggish stream, at the shallowest part of it. The insect repeatedly thrust its abdomen down through the water, and into the mud. My friend could see the slight disturbance in the mud as the point of the insect's abdomen entered it and was again withdrawn. The fly was depositing its eggs. Here then was revealed one reason why the dragon-fly has so lengthy a tail.

It is interesting to see one of the "Demoiselles"—Agrionidae—alight on a floating leaf of a Pond Lily, and bend its long abdomen round the edge of the leaf to affix its eggs on the under side—the side in contact with the water.

The perfect fitness of every part of an insect for the functions it has to serve will always be admired by the inquiring and thoughtful observer.

In our early lessons in Entomology certain facts were impressed upon our mind, viz.—that an insect is a creature that is cut into or notched; that the notches mark out the head, the thorax, and the abdomen; that the insect passes through four stages of existence—the *Egg,* the *Larval,* the *Pupal* and the *Imago* stages.

In this short article I purpose to offer a few desultory remarks on the several features of the insect form, and on the several stages of insect life—endeavouring to show the admirable fitness of the insect to meet, at all times, the exigencies and requirements of its existence.

The Head. In the head of an insect the striking and important features are the eyes, the mouth organs, and the antennæ.

In the larger dragon-flies (Fig. 12), such as those in the genera *Æshna* and Anax—insects of extremely rapid flight—the eyes occupy the main portion of the head space. The huge compound eyes of *Anax junius* are contiguous; yet they allow room for three ocelli. Nothing seems to escape the glance of these splendid insects; and in the bright sunshine, when they are most active, the ease with which they evade the sweep of the net of the entomologist, though it may be provoking to the sportsman, must nevertheless awaken his admiration.

Fig. 12. Dragon Fly.

Fig. 13. Damsel Fly.

In the Agrionidoe or Damsel-flies (Fig. 13),—insects of less rapid flight—which can take a more leisurely view of things—the head, as Wood remarks,*

* "Insects at Home," page 275.

FIG. 14. Giant Water Bug.

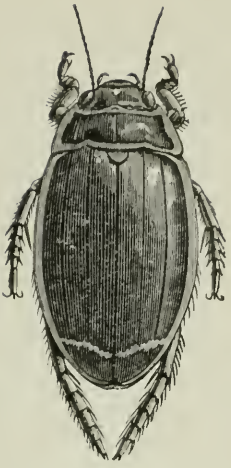


FIG. 15. Diving Beetle.

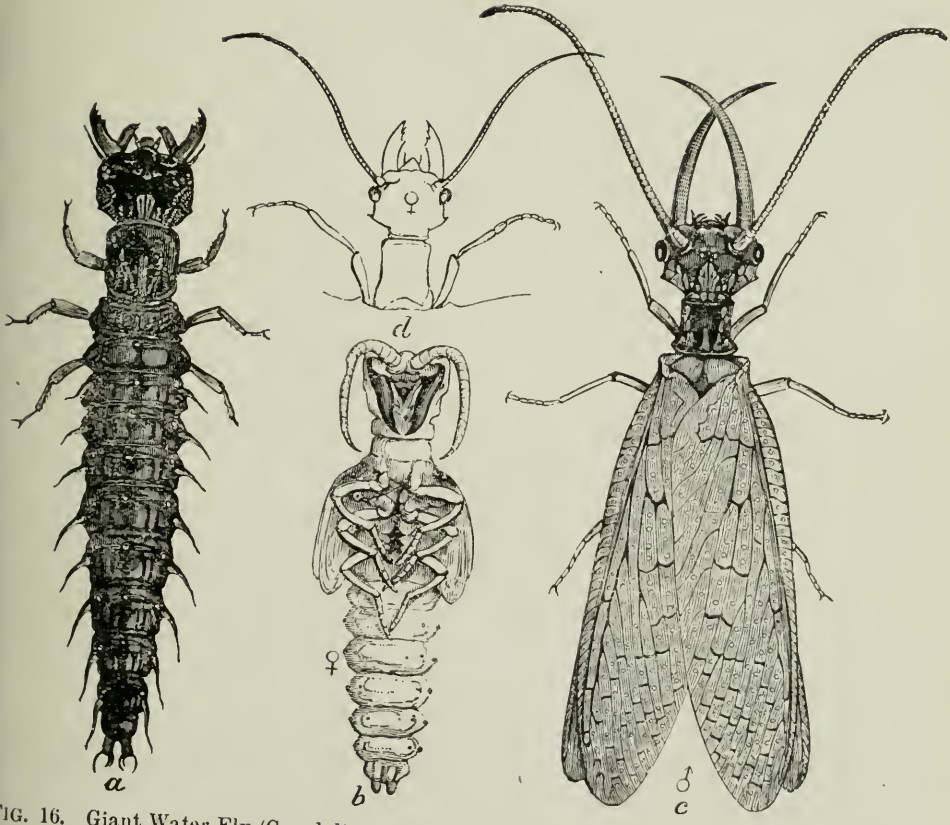


FIG. 16. Giant Water Fly (Corydalis cornutus), (*a*) larva ; (*b*) pupa ; (*c*) male fly ; (*d*) head of female fly.

reminds one of that of the Hammer-headed Shark; and the eyes project from the sides of it. These dragon-flies, like others of the Odonata, can turn their heads half round on the neck, and so look over their shoulders.

Another insect with large and protruding eyes is the Giant Water Bug, *Belostoma Americana* (Fig. 14). So far do the eyes of this insect protrude one might almost expect that, in the wild dashes of the insect through the upper air, and into and under the water, they would be swept from their position. But a remarkable provision prevents the danger; from the centre of the saucer-like eye-socket arises a stout support, flattened out a little at the top—somewhat spool-shaped—and around this the eyelets of the compound eye are compressed. (Fig. 15).

In the Diving Beetle, *Dytiscus Harrisii* (Fig. 15), an insect of very similar habits to *B. Americana*, the eye is so placed in the side of the head that the creature can see both above and below; and the organ is protected by a curved extension of the pro-thoracic shield.

The like protection is afforded to the eye in water-beetles of other genera—Hydrocharis, Colymbetes, Acilius, etc., while in Dineutes the eye appears to pass through the substance of the head, so that the insect seems to have four eyes—two above and two below.

That widely different and very minute insect the White Fly of the greenhouse appears to have eyes similarly arranged to those of Dineutes. In the fly the eyes appear as two black dots above, and two black dots beneath the head.

The mouth organs of insects vary considerably to suit their different habits. There is a striking difference in the mandibles of the male and female imagos of the Giant Water Fly, *Corydalis cornutus* (Fig. 16). This is the more remarkable because in the larval and pupal stages of the sexes the organs apparently are alike. Some years ago I traced the life-history of this species through its metamorphoses. I saw the nymph draw itself about in its cyst, by means of its formidable mandibles; and I expected that, when the change to the imago came, the insect would prove to be a female; but lo, when it came, and the imago burst from the nymphal case, the mandibles were extended (I presume by inflation) into the preposterous organs we see in the male. Why is this difference between the male and the female mandibles? It is that the male may be able to give a loving embrace to the well-defended neck of its mate.

How strangely the lips and jaws of the dragon-fly work, in masticating its food, as if they were at cross purposes, the lips perpendicularly, the jaws horizontally—they are two pairs of very effective cutting knives.

Belostoma Americana lives by sucking the life-fluids of its prey, and is furnished with a stout beak-like proboscis, about a quarter of an inch long. This proboscis consists of an outer pointed case, having a longitudinal slit in front, and of an awl-shaped sucking instrument enclosed in a divided sheath barbed at the extremity. It is a formidable weapon.

The bug clings, by means of its powerful front legs, which are terminated with sharp claws, to the fish or other creature that it assails, and thrusts its proboscis into its victim.

The Reduviidæ, or "Assassin Bugs," are furnished with beaks of like construction. The stories told us of the "Kissing Bug" have led us to understand how dangerous, under some circumstances, these weapons may become.

The proboscis of the House Fly is terminated by two ridged valves with which the insect scrapes up its food. Those who have volumes bound in sheep-skin, and exposed in open cases, will soon find, from the roughness and loss of gloss in the binding, that the flies have been at work upon the dressing of the leather.

How different, and how wonderful, are the trunks of the nectar-sipping moths and butterflies! They lie curled up so compactly within the sheltering palpi, and can be extended so far when occasion requires. The length of the proboscis in these cases enables the insect to take its food, as it hovers over the blossoms, without injury to its wings.

Of the purposes served by the antennæ of insects we know but little; but it is obvious that they are fitted to the requirements of the species they adorn; the bee, which enters blossoms in search of pollen and nectar would find antennæ like those of *Paniscus geminatus* unmanageable and entangling; and *Geotrupes Blackburnii,* would have difficulty in delving in the earth, if it were burdened with antennæ like those of *Monohammus titillator.*

The Thorax. To the thorax of insects are attached the legs and wings.

Passing amongst the Golden Rod, this Fall, I came across three species of insects that secure their prey by means of their fore-legs, viz.—*Mantispa brunnea* (Fig. 17), *Acholla multispinosa,* and *Phymata erosa.*

Like the Praying Mantis of which Hood speaks, in his "Ode to Rae Wilson, Esq.," as—

> "An insect, of what clime I can't determine,
> That lifts its paws most parson-like, and thence,
> By simple savages—through sheer pretence—
> Is reckoned quite a saint amongst the vermin,"

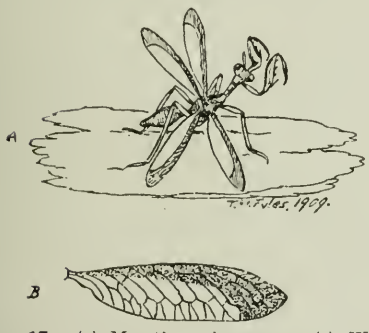


Fig. 17. (*a*) Mantispa brunnea; (*b*) Wing of M. brunnea much enlarged to show the venation.

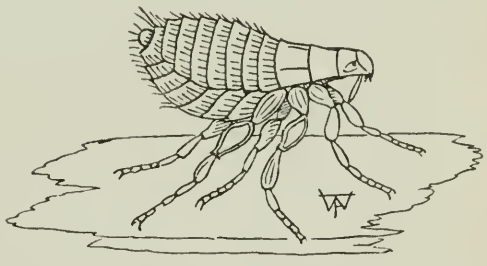


Fig. 18. Bat Flea.

so, *Mantispa brunnea* lifts its paws, with sweet "petitionary grace," lying in wait amongst the flowers. When *Argynnis myrina,* or some other incautious innocent butterfly comes within its reach, *M. brunnea* secures it with its outstretched arms—which are truly arms of offence.

Acholla multispinosa is a creature of like habits to *M. brunnea;* and its fore limbs are set thickly with sharp spines (hence the name), which enable it the more readily to secure its prey.

But the most remarkable of the three species is, I think, *Phymata erosa.* This insect in its colours closely resembles the flowers of the Golden Rod in which it lies in wait. On occasion, the tarsi of its extended fore-legs spring back into a toothed groove in the large and powerful tibiæ, and hold a captive as in a vice.

In *Dytiscus Harrisii* the upper portion of the foot in each of the fore-legs is expanded into a disk or pad, supplied on the under surface, with suckers which exhaust the air, so that the insect can attach itself firmly where it is inclined.

These appendages are not found in the female. Moreover, while the male Dytiscus is remarkably smooth and slippery, the female is roughened with striæ.

In *Acilius fraternus* a like provision is found in the foot of the male, to that in the foot of the male Dytiscus; and in this species also the female has roughened elytra.

The powerful hind limbs of the insects that have been named SALTATORES, such as the crickets and locusts, are worthy of observation. But other insects beside these Orthoptera have great powers of leaping:—

On the 24th of May of this year I was sitting on the veranda of Mr. Garrioch's house, on Front Street, Hull, when I saw a bat fall from a tree on the lawn. The little animal was in a very weak condition. While I was examining it I saw a flea creep from the fur, and then bound upwards one hundred times its own height. (If an acrobat could leap 600 feet into the air, he would draw multitudes to witness the feat.) (Fig. 18.)

I put the bat in a box, and obtained from it *thirteen* other specimens of the same kind of flea. No wonder the little animal was in a weak condition.

This *Pulex vespertilionis* was different from *P. irritans* and *P. serraticeps*. It was about two millimetres long. Its dorsal parts were of a light chestnut colour, and its ventral parts of a pale amber. The legs were translucent. The trocanters were grooved. The femur in each of the middle and hindmost legs was large, flat, and cleaver-shaped. Around it, near the edges, was a slight indentation. The tibia was striated and bristly. The tarsus had five joints with two bristles at each joint. The abdomen was hairy.

Of the wings of insects, fine examples of venation are afforded by the water-flies *Pteronarcys proteus* and *Polystoechotes punctata;* of elegance of form by *Actias luna and Hyloicus chersis*—and of splendour of colouring by *Philampelus achemon* and *Plusia balluca.*

THE ABDOMEN. How great a difference there is between the telescopic ovipositor of the house-fly which is concealed in the abdomen of the insect, but can be extruded by pressure, and which is fitted to penetrate the manure from the stable in which the larvæ of the fly luxuriate—and that of *Thalessa lunata*, which in some instances extends for four inches beyond the extremity of the abdomen, and is fitted to be passed along the tunnel, choked with frass, at the end of which the larva of *Tremex columba* is working. The young larva of Thalessa follows up and preys upon the larva of the Tremex.

The ovipositor of the last named insect proceeds from the middle of its abdomen, and not from the end. It is shorter and stouter than that of Thalessa, and is adapted to penetrate the bark and white wood of the trees suitable for the sustenance of the larvæ of its species.

THE EGG. Some years ago I found a huge boulder in a swampy wilderness. In a slight hollow, in the top of this, some vegetable mould had accumulated; and a thick pad of moss covered it. On lifting the moss, I found some hundreds of eggs of the Red-legged Locusts packed together in the soil. The locusts had found in the position a suitable nursery for their young.

The life of the Day-fly is very brief—as its name implies. It does not allow much time for oviposition. One act of extrusion consigns its eggs, in a boat-shaped mass, to the surface of the water.

The Cockroach frequents the house, but is highly objectionable to the housekeeper. Its eggs are laid in brown packages—oöthecœ—in the crevices about the kitchen-ranges and the cellar-furnaces. In these they escape notice.

The ovipositor of the Domestic Cricket has a divided sheath—each half of it having a spoon-shaped termination. When closed these terminals hold the egg, as in a casket, till a fitting nook for its deposit is reached; and then, they open and discharge it.

The cat shakes the eggs of the fleas that infest it into the lap of its mistress, or upon the rug on which it sleeps. The larvæ of *Pulex serraticeps* feed upon the particles of food that they find in the cracks of the flooring of the dwelling-place—but if the sheep-tick were to lay eggs that could be shaken from the wool of the sheep, her progeny would perish. Against such a contingency she retains her young till it reaches the pupal stage. The abdomen of the tick is unsegmented, and vellumy, and therefore very strong.

The Larva. The resemblance by which some species of Lepidopterous larvæ deceive their foes, and the threatening attitudes assumed by others, to drive their enemies away, are very familiar to all of us. But the very remarkable provision for the safety of the larvæ of *Harrisimemna trisignata* is not so well known.

And here we must call to mind that many caterpillars—those of *H. trisignata* among them—when undergoing the usual moult, withdraw the head from its old case, at its junction with the second segment—at the neck-opening—as a knight of old withdrew his head from the helmet. I raised a brood of larvæ of *Anisota virginiensis* last season. With them the head case was hard and black; but the head when it was withdrawn was soft and green. However, it speedily became rigid and dark as before.

Fig. 19. Harrisimemna trisignata. (Walker).

Now in the case of the grotesque larva of *H. trisignata* (Fig. 19)) on the thoracic segments there are some long stiff hairs which seem to have lain under the skin before the previous moult, and to have been attached, by their tips, to the inner side of the head cover. When the change of skin took place the hairs were erected, retaining their hold upon the head-case. At the slightest disturbance the larva agitated the bristles and the attached case is swung backwards and forwards with great rapidity.

I raised this insect some years ago, and subsequent observation has convinced me that we may see in this a natural provision, to protect the larva from troublesome ichneumons.

Cassida viridis appeared in this country a few years ago. It feeds on the Burdock and lies exposed on the plant. A curious provision is made to preserve the larva from the heat of the sun, and to render it unattractive to predacious insects and birds. By a fork-like appendage to the anal segment, the *fœces* are retained and supported over the dorsal parts of the larva, and form a protective wad, or shield.

The Pupa. In the month of September, larvæ of the Saw-fly, *Cimbex Americana*, may sometimes be seen curled up, helix-fashion, on the ground, under the trees on which they fed. It will generally be found that they are parasitized—victims of *Opheltes glaucopterus*. They may have strength remaining to enable them to creep into some retreat; they may even attempt to spin the cocoon in which under normal conditions, they would spend the winter months; but they fail. Within them is the foe that is exhausting their vitality. This creature undergoes the pupal change within the frame of its host, and, at length, bursts from it as a perfect fly.

The fine ichneumon *Trogus fulvipes* undergoes the pupal stage within the pupa of the beautiful butterfly *Papilio troilus*.

I may cite the following as a remarkable instance of the instinct of a larva about to undergo the pupal change:—There was a needle-book, formed of alternate leaves of white and golden flannel, lying open on a shelf in my study. One night a larva of *Samia cecropia* escaped from the box in which it had been brought to me, and disappeared. Sometime afterwards I found that it had spun a cocoon in the needle-book, and had fastened a white fold on one side of its cocoon, and a yellow fold on the other. To disguise its work more effectually it had secured in the meshes of the cocoon, frayings of the white flannel on the one side, and frayings of the yellow on the other.

Volumes might be written upon the adaptations in structure which fit the insect for its environment, which enable it to supply its wants, and which ensure the perpetuation of its species. The Naturalist delights to look into these things. Considering them he feels, as David felt, that the Divine Designer of the Universe "hath so done His marvellous works that they ought to be had in remembrance."

"The melancholy days" have now come—"the saddest of the year;" but we still can find pupæ of insects in their snug retreats; and we know that, when "Heaven shall repair her rural seat," objects of beauty will burst from cocoon and chrysalis, to gladden the hearts of the beholders.

THE ACARINA, WITH A HOST INDEX TO THE SPECIES FOUND IN ONTARIO.

By Tennyson D. Jarvis, Ontario Agricultural College, Guelph.

There is probably no more widely distributed order of Arthropods than the Acarina; in economic importance there is none of greater value; and within the range of the whole animal kingdom there is no study so varied and fascinating as that of the Acarids, commonly termed Mites. The relation of these to other Arthropods has never been clearly defined, but in many respects they bear a close

resemblance to Spiders and Scorpions in the Arachnida, and by the best authorities have been put in one order of this class.

However, in structure they are so unlike and in habits they are so varied that one never loses interest in his researches. Perhaps one of the most interesting features in the study of mites is shown in the manner in which they protect themselves against their enemies by special adaptations. The species belonging to the genus Nothrus are found on the bark of spruce and pine and appear in colour and shape like tiny bits of bark and lichen. A species of Analgesid, found on the wings of the Baltimore Oriole, presents precisely the same shade as the feathers of the wing. *Tetranychus spinosa,* which feeds in the upper surface of the leaf of the basswood, is identically the same colour as the leaf, and the writer found it impossible to detect the difference except by use of the microscope.

In the Gall Mite family the young mites are almost as translucent as are the trichomes, but when with age these trichomes turn brown and then black, the mites also assume the same colours in the same manner. Any number of similar examples might be mentioned if space permitted, but sufficient has been said to indicate the adaptation of these animals to their colour environment. Another species of Nothrus may be mentioned as demonstrating protection from dryness and heat. In this case the mite accumulates a covering of dust upon its back. Similarly at the approach of cold, the mite surrounds itself with particles of any substance within reach. Further illustrations of adaptation to environment are seen in a species of mite found upon the roots of Yarrow, with legs broadened, mole-like, fitting it for digging and burrowing in the earth. In the genus Cheyletus, the palpi are large and branched, fitted for grasping, and the mouth parts are long and piercing, providing the mite with suitable weapons for a predaceous life. Aquatic species are greatly modified forms of land mites, with flat and hairy legs, enabling the mite to propel himself quite freely in the water. The parasitic mites attacking all kind of animals have many special devices for attaching themselves to their host and adequate provision for obtaining nourishment from the body of the victim.

The curious shapes and odd looking appendages found in many of these creatures appear to the observer to be more ornamental than useful. The bird mites with their angular construction and long tail-like appendages afford the best examples of this class. The sugar mite *Glyciphagus* with its fan-like attachments is another instance of apparently useless equipment.

In richness of colour and beauty of marking, the Tetranychids and Analgesids are most noticeable. Indeed, some of these handsome species are worthy of the attention of any one interested in the field of Nature. Among the most remarkable phases of animal architecture are the abnormal constructions of vegetable tissues produced by species belonging to the family Eriophyidæ. About seventy different species of these worm-like creatures inhabit trees, shrubs and herbs of Ontario flora.

Not the least wonderful of the habits exhibited by the Acarids are their modes of distribution. As will be shown in our discussion of the dung beetles, many species of the scavenger mites make use of dung beetles and flies to bear them to new feeding grounds. A few species are specially provided with a cord, secreted by glands in the body, by means of which they fasten themselves to their carriers.

Another interesting feature in this connection is their friendship to other animals, a few species sharing the home of many of the common species of ants. Here we find the ants repaid for their hospitality to the homeless mites by having

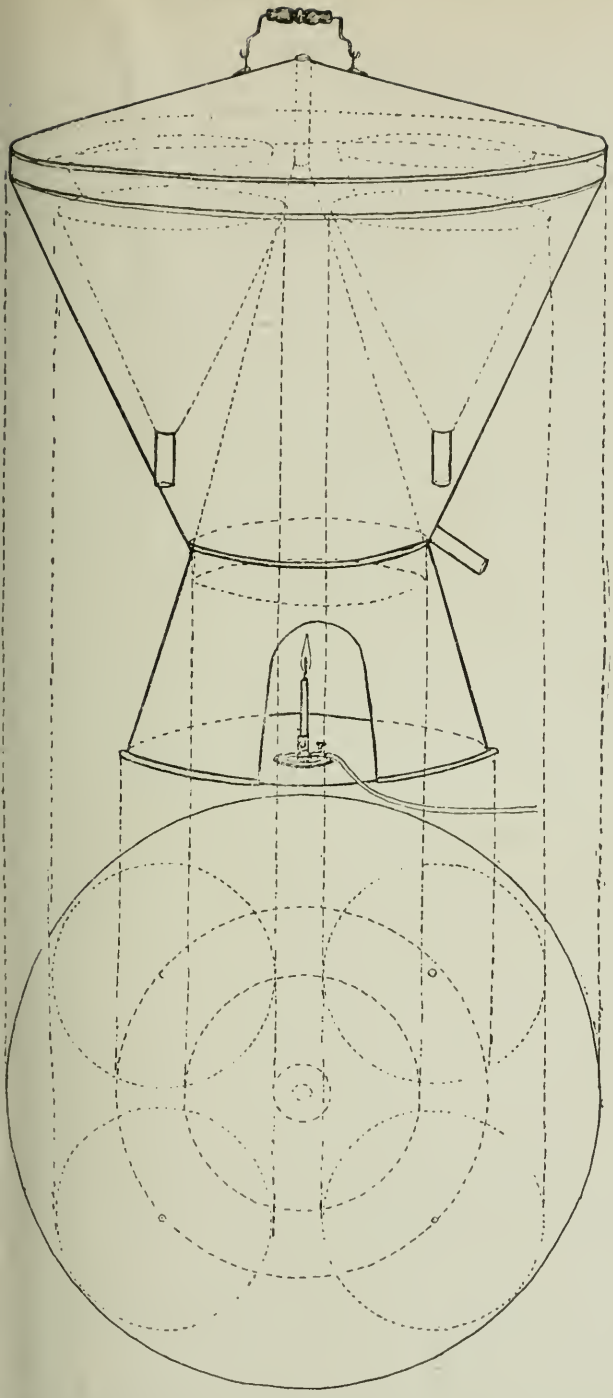
their quarters kept in cleanly condition by getting rid of the cast-off skins which are largely devoured by these active little scavengers.

Because of their relation to disease, their parasitic habits upon man, animals and plants, and their beneficial effects as scavengers, it is hard to over-estimate their importance. There are at least eight well-defined diseases of man and domestic animals, all isolated within the brief period of five years, which are transmitted from host to host by means of these mites. Numerous species spread the spores of bacterial and fungous diseases from affected organisms to healthy plants. As animal parasites they are found upon insects, crustaceans, mollusks, fishes, amphibians, reptiles, turtles, birds and mammals. As plant parasites, almost every known plant is attacked by one or more of these hungry mites; and as scavengers they are found on all decaying matter. In spite of their vast importance, not much has hitherto been done in Canada in working out the different species and determining their habits. This is in part due to their very minute size and also to the difficulty in locating them. For the little we do know, we are indebted to Mr. J. B. Tyrrell, of Ottawa, for his investigations on Analgesids, and to the late Dr. Fletcher for his contributions on the habits of some of our common species of vegetable pests. In the United States much has been done in a systematic way by Mr. Nathan Banks, Bureau of Entomology, Washington.

The species in the list outlined in this report were in almost every case collected in the vicinity of Guelph. This study was first taken up in 1904 and since that time the writer has collected, examined and studied to some extent the habits and characteristics of upwards of three hundred species, one hundred or more of which are new and many of them belonging to genera new to North America.

Mites are known to exist and to cause trouble in every part of the world, but in the temperate zones the largest numbers of species abound. Usually they are found in semi-dark localities, but a few species seem to enjoy full sunlight, being found upon the upper surface of leaves. On account of their minute size, certain species can be obtained only by use of special devices, such as mite traps; others again, such as bird mites, which are nocturnal in habits, must be gathered at night; still others, as the Eriophyes, which closely resemble their surroundings, require several days of constant search. Special emphasis should be laid upon the construction and operation of the mite traps. The trap consists of a copper cone-shaped vessel lined with tin, affording a smooth surface, to prevent the mites from attaching themselves to the sides of the cones. Within the body of the outer cone are four smaller cones, to the ends of which are attached small bottles, and in these the material under examination is placed. The outer vessel is then filled with water at a temperature much higher than the normal habitat of the mites. The discomfort thus produced causes the mites to leave their host or habitat, and as almost without exception, Arthropods when disturbed travel downwards, they slide down the smooth inner surface of the cone into the bottle below, where they are readily available for examination. Sometimes they are preserved in alcohol, sometimes mounted in glycerine jelly or balsam, and if intended for life history study they are transferred to artificial media.

The aquatic apparatus is made of the same materials as the terrestrial one, viz., tin and copper. It works upon much the same principle as the one just described, *i.e.*, when an Acarid becomes uncomfortable the tendency is to go downwards. But instead of applying heat as in the case of the land trap, a few drops of formalin or alcohol is added to the aquatic material. The trap with the proper fittings may be taken to a pond or stream where various kinds of material are available, and in the course of a single day's work many species may be captured.



IG. 20. Apparatus for collecting small terrestrial Arthropods.

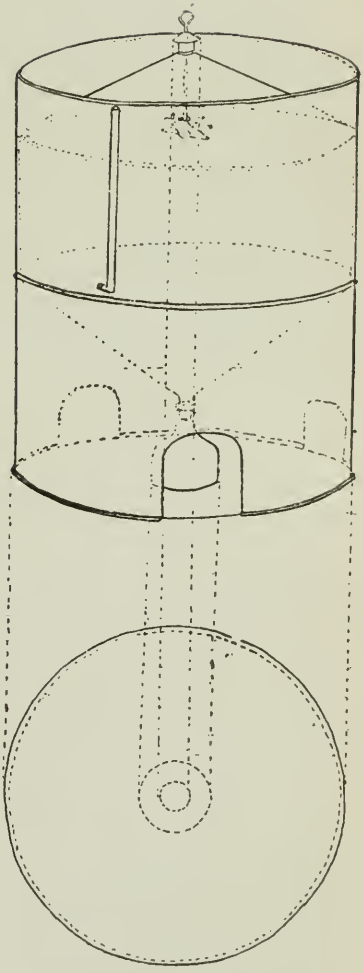


FIG. 21. Apparatus for collecting small aquatic Arthropods.

At the College over one thousand kinds of material were examined and almost all were found to contain one or more species of mite, in some cases as many as twelve different species were procured from a single substance. To give some idea of the kinds of materials tested, we might mention the following: manure, moss, decaying vegetables and leaves, dead and living animals, herbaceous plants, bark and leaves of trees, tubers, bulbs and roots, bone, stone, nests of birds and mammals, soil, pine and spruce cones, ensilage, fleshy fungi, all kinds of grocery commodities, clothing, fruits of all kinds, and sawdust.

Some of the living mites obtained from the mite machines were transferred to pure cultures in order to study their habits and life history. It was found that on proper media it was possible to keep them alive through several generations. Some of the media used are as follows:—First, for living animals—mosquito pupa extract and beef peptone. For living plants—extract of the same plant and on the living host plant. The extract of the plant was made by using two parts by weight of water to one of plant material, and the two heated one hour in a sterilizer and filtered. For mites living on dead matter, the cultures were made in three ways, first, for mites living in nitrogenous substances the culture consisted of whey-peptone, whey 80 per cent., agar 10 per cent., and gelatin 10 per cent. Two other cultures for the nitrogenous feeders were cheese extract and beef extract. On saccharine and acid fruits the media consisted of apple juice. On vegetable matter a culture of potatoes and potato extract gave best results.

The gratitude of the writer cannot be too strongly expressed to Mr. Nathan Banks, Acarologist of the Bureau of Entomology, Washington, for his able and ready assistance in identifying a large number of species sent to him, and to Messrs. W. R. Thompson, B. Barlow, George Chadwick, Geological Hall, Albany, N.Y., and Dr. Bethune, for assistance rendered in various ways.

I.—HABITS OF THE CLASS ACARINA AS AGENTS IN THE TRANSMISSION OF DISEASE.

Spread of Bacterial and Fungous Diseases.

In pathological and bacteriological laboratories, mites are a great nuisance by inoculating pure cultures. Four species were found at the Ontario Agricultural College,—*Tyroglyphus Americanus* and *T. longior* feeding upon non-nitrogenous media, and *Cheyletes clavispinus* and *C. longipes* feeding on nitrogenous cultures. They make their home in the incubators, and gain entrance to the pure cultures through the cotton wool in the test tubes and between the fittings of the Petri dishes. The spores of bacteria and moulds attached to the appendages of the mites are left behind in the pure cultures, where they multiply rapidly and cause no end of trouble.

The spread of bacteria and moulds in root houses is not duly appreciated. More than a dozen species have been found at Guelph inhabiting turnips, beets, carrots, mangels, parsnips, potatoes, spreading spores of affected roots to healthy ones. Especially noticed in cellars of this kind are *Galumna moesta, Rhizoglphus phylloxerae* and *G. depressa* on turnips; *Oribatta depressa* and *T longior* on mangels and turnips, and *Gamasus* species on sugar beets and on parsnips, potatoes, celery, etc. On fruit trees the spread of brown rot, cankers, pear blight, etc., are carried to a large extent by such species as *Tetranychus telarius, T. bicolor, Bryobia pratensis, Oribatella pallida,* and *O. formosa.*

Here it might be mentioned that the fruit grower may do much in the way of avoiding diseases of the kind mentioned by frequent applications of the common insecticides.

In Grocery stores cleanliness cannot be too strongly emphasized, as this is one of the favourite resorts of mites. A few examples of the spread of bacteria and fungi will give an idea of their destructive habits to the groceryman. They crawl underneath the lids of manufactured jams and jellies, carrying with them spores which multiply and bring about putrefaction. In dried fruits, sugar, and other sweets, flour, bread, cheese, etc., they carry a number of species of moulds and often cause tremendous loss, which might easily be avoided if the proper care were practised. *T. longior, T. Americanus, Aleurobus farinae, Carpoglyphus sp.* are examples of Grocery pests.

In horse stables and other buildings, mites are found abundantly, especially where imperfect lighting and cracks and crevices of concealment are features of the buildings. *T. longior* might be mentioned as the commonest house mite. It is found from cellar to attic and practically on every object, thus we see the probability of its spreading spores of bacteria and fungi. The ensilage mite which makes its home in the silo is a good example of a stable mite. It, no doubt, spreads spores of some of the numerous bacteria and fungi found in ensilage. Another example of how mites may spread disease from stable to house is the case of the house-fly mite which travels on the backs of flies and may be transported from the manure of the stable to the food in the pantry, *e.g., Histiostoma Muscarum.*

Spread of Protozoan Diseases. Nearly all of the diseases belonging to the genus Piroplasma are transmitted from animal to animal by means of these ticks or mites. In the United States there are two very well known pathogenic diseases which belong to this group. The Texas Fever (*Piroplasma bigeminum*) and Spotted Rocky Mountain Fever (*Piroplasma sp.*) In Asia and Africa six other well known diseases, *Piroplasma ovis* of sheep, *P. canis* known as Piroplasmosis of dogs, *P. equi,* Piroplasmosis of the horse, *Piroplasma Sp.*—Rhodesia fever, and *Haemoglobinurina* of Finland. Space will not permit of discussion of this important phase of the subject. At present we have no record of any diseases spread in this manner in Canada, but since we have here numerous species of ticks associated with animals it is not unlikely that in time we shall find examples of diseases carried in this way.

As Parasites of Animals.

Man.—Among the mites that are injurious to man might be mentioned, first, those that are parasitic and spend the whole of their existence in the host; second, those like the ticks that are casual visitors; and, third, those that inhabit his house and clothing and cause annoyance by their presence. The first is exemplified in the follicle mite which lives on the secretions of the follicles of the skin, such as *Demodex follicularum* and the "Jigger" of the Southern States. Examples of the second class are the numerous species of ticks. These are found in the tropics, and are abundant in fields, woods and pastures. They leave the herbage to attach themselves to man and other animals, where they burrow into the skin and create considerable irritation. In Ontario ticks are not so abundant, but in some parts the wood tick leaves its common habitat to attack man in the way just described. The harvest mites, found in grass, hay and cereal crops, when found in large numbers also cause much irritation. The species known as *Carpoglyphus passularum* found in sugar in grocery stores often leaves the sugar to attack man, causing what is known as grocer's itch. The most common species found in

houses are the Clover Mite (*Bryobia pratensis*) and the Cheese Mite (*Tyroglyphus longior*). The Clover Mites often swarm in houses in the fall of the year, where they frequently hibernate through the winter. They get into the cracks and crevices of chairs, windows, doors, etc., and cause great annoyance to the occupants of the house. The Cheese Mite is even a more serious pest, intruding itself into all the darker parts of the house. It is found in the cellar, on fruits, tubers and other food products; in the pantry on cheese, butter, flour, meat, pastry, etc.; in the wardrobe, particularly on worn and stained clothing; in the library on the paste of the book bindings; in upholstered furniture in all the niches and hollows where they can conceal themselves. Still more annoying is their habit of crawling from the clothing to the body, and in many cases, while not actually on the person, the imaginary discomfort is just as effective. The species is not parasitic. Fumigation with hydrocyanic acid has given fairly satisfactory results as a remedy for this mite.

Domestic Animals. Most of the injurious parasites of domestic animals, such as sheep scab, mange, ticks, follicle mites, belong to the Acarina. The sheep scab caused by the mite known as *Psoroptes communis*, var. *ovis*, is a serious disease of the sheep throughout the world. In Ontario it has occurred in Manitoulin Island and a few other parts, but by proper precautions it has either been exterminated or kept in check. They live in the skin, and obtain blood or lymph as food from the host, and in this manner give rise to considerable irritation, resulting in inflammation, scab formation, and finally in loss of wool and hair. The best treatment consists in using some external applications, such as dipping, which will kill the parasites.

The disease known as mange is caused by species belonging to two different genera, Sarcoptes and Chorioptes. The Sarcoptes when young burrow in the tissue, where they feed and develop. The species of Chorioptes do not burrow in the skin, but produce a scab similar to sheep scab, but it is restricted to certain parts of the animal, as the feet, the ears and the neck. A species of Sarcoptes causes eruptions and inflammation of the skin of horses, which becomes intensely itchy, the animal at this stage refusing food and becoming much emaciated. A species of Chorioptes is found on the horse, cattle and goat, the one attacking the horse being the most common.

Scarcely any of the domestic animals escape the attacks of the mites known as ticks. The ticks are large mites with tough, leathery skin, and possessing mouth parts fitted for sucking and legs fitted for holding on to the host. They are true external parasites and cause much annoyance by getting into the ears, around the eyes, and other places where they can avoid the efforts of the animals to dislodge them. They are most abundant in the tropics, but a few species are native to Ontario, and others again, such as the Southern cattle tick (*Boophilus bovis*), are imported to this country along with the stock.

The follicle mite of swine (*Demodex phyloides*) is the chief member of the mite class attacking swine. They live in the follicle and cause white tubercles on the skin from the size of a pin-head to that of a pea.

Wild Animals.—These, of course, are not of so great economic importance, but when further studied they may be found to play a part in the transmission of disease from wild to domestic animals or man. It is astonishing to find on some animals such vast numbers of these pests. The ground hog is especially a victim to a number of species. The muskrat, the squirrel, the bat, the mole, the mouse, the

moose and deer all must suffer considerable annoyance from the presence of these pests. In the study of this group several new genera were established for North America.

Only a few amphibians were examined, and on one, the Leopard frog, a species of Gamasid was found in abundance attached to the skin, apparently doing no harm, but perhaps considerably annoying its host.

Several Ontario reptiles were examined, but the writer found no indication of parasites at work. However, in the United States an interesting species of tick has been known to attack snakes.

Practically all the domestic birds suffer from the attacks of one or more species of mite. The chicken mite, *Dermanyssus gallinae,* is the commonest and most destructive pest of poultry. It is noctural and rests during the day in the crevices of roosts and nest boxes and other places of concealment. It multiplies rapidly and, unless checked by insecticides such as kerosene, will soon ruin a flock of poultry. An interesting species is found in the nasal chambers of domestic and wild birds. The injury they do has not yet been fully ascertained, but in many cases where they are very numerous they cause suffocation by choking the nasal passages. In Rhode Island a species of mite has been found in the air sacs of turkeys in every part of the State. It is again doubtful in this case as to just how much damage they cause. On the pigeon several species are found, some attacking the feathers, some the skin and others the legs and feet. These are only a few examples of the many species found on domestic fowl. It might also be mentioned here that through the agency of large shows, as the International held in Canada and the States, the tendency will be to exchange and distribute the various species of North America.

Our native birds are among the most favoured by the mite pests. In our study so far, we have found over fifty species in Ontario. Their habits vary, some living parasitically, such as Liponissus sp.; others symbiotically as in case of Analgesids; and still others merely as guests. Since many of our common birds associate and feed with our domestic birds, they may easily pass from one to the other. These again are of little economic importance so we need not discuss them further.

Fanciers of caged birds are not exempt from troubles arising from the attacks of these parasites. A species known as *Dermanyssus avium* is very common everywhere caged song birds are kept. Their habits are similar to those of the chicken mite, hiding in crevices of the roosts by day and sucking the blood from their victims at night.

As Parasites and Guests of Insects and Other Mites.

A striking example of the manner in which mites assist in maintaining the balance of nature is afforded by these parasitic and predaceous creatures. It is a well known fact that many of our most injurious insect pests of fruit, garden and farm crops are controlled more effectively by the Acarids than in any other way. A notable example of this kind is found in the Locust Mite, *Trombidium locustarum.* The mite is generally found attached to the base of the second pair of wings, although it is also found on the wing itself and on any other part of the body, where it cannot be easily detached by the locust. A favourite position upon the body is between the segments of the thorax and abdomen, and also behind the upper joints of the legs, in such position their only means of attachment to their host is apparently by their mandibles. As many as a dozen or more of these mites may be found upon a single insect. These little mites render good service in

checking the spread of locusts, as almost every locust upon which one is found appears to be feeble and sickly. Another species, *Celaenopsis latus,* attacks the larva of *Passalus cornutus,* and still others, attacking garden pests are found on the larva of Lachnosterna. Attacking fruit tree pests may be mentioned *Hemisarcoptes malus* on San José Scale and Oyster Shell Bark Louse; *Rhyncholophus sp.* feeding on San José and New York Plum scale; *Cheyletes pyriformis* on the larva of the Codling Moth. On forest tree insects we have a species destroying the Cottony Maple Scale and another species attacking the Maple Plant Louse. On household pests we have *Histiostoma muscarum* parasitic on the house-fly and other species on mosquitoes. The mites themselves are largely kept in check by predaceous and parasitic species belonging to this group. *Sejus macrophylus,* found in the Aspen *Eriophyes* gall, and *Gamasid* species attacking Pear Leaf Blister mite. Here we might also mention that a large number of the aquatic insects are parasitized by Hydrachnids (water mites). Besides the species found preying upon insects there are a large number which attach themselves to the body of the insect without causing any apparent harm or annoyance. Examples of these are the following:

Uropoda sp. on Rough Osmoderma, Cerambycids, Skin Beetles, Tumble Bugs, Darkling Beetles, etc.; and *Macrocheles sp.* on Carrion beetles, Silpha, and Horned Passalus.

As Parasites of Water Insects.

The water beetles and bugs are mostly parasitized by a species *Hydrachna belostomae* which attaches itself to the ventral surface of the Electric Light bug.

As Parasites and Guests of Mollusks.

A number of species of water mites have been collected from the gills and attached to the bodies of bivalves but the identification of these have not yet been completed.

As Scavengers.

As a means of elimination of waste materials, there is probably no more effective agent than the mites. There is no kind of filth or decaying matter which is not relished by some species or other of the Acarids. In manure, sewerage, decaying vegetable matter, decaying animal matter and all forms of dirt, mites are to be found actively engaged.

Of Manure. Samples of nearly all kinds of manure were used in the mite machine, and in almost every case mites were obtained. *Histiostoma valida* is a common example in horse manure.

Of Decaying Vegetable Matter. Decaying potatoes, mangels, turnips, parsnips, carrots, kohl rabi, corn stubble, cabbage, lettuce, decaying leaves, humus in the soil, sawdust, rotten stumps, fleshy fungi were all found to be hastened through the stages of decomposition by these busy creatures.

Of Decaying Animal Matter. Almost every particle of thrown-off material from the animal body such as epidermal scales of birds and mammals, moulted skins of insects, are readily consumed by some species of these scavengers. Bone horn, flesh and hair are also their foods, and it is next to impossible to find a single bit of any of these substances without finding along with it certain kinds of mites.

Of Mineral Matter. Mites were found upon rock and stone in all case of weathering, in every little crevice where the wearings from the rock had lodged

gain, specimens were found even in the solid rock, where, without any apparent means of sustenance, these active little creatures seemed to thrive. An example of his species is *Scutovertex petrophagus,* found at Trahanic Falls near Ithaca, N.Y.

Bush and Fruit Tree Pests.

In Canada and other countries mites that attack bush and fruit trees are among the more serious pests of the fruit growers. In Canada they are found on the apple, plum, pear, etc., and in tropical countries they are very destructive to citrous fruit trees. Examples attacking the apple tree are the Pear Leaf Blister mite, *Eriophyes pyri,* which is widely distributed throughout most of the apple growing region. They form red blister-like spots about one-fourth of an inch in diameter, which turn brown in late summer, the tissues becoming hard and corky. Three or four other species belonging to the genus Eriophyes have not such economic importance. The same species found on the apple are found attacking the pear and other trees belonging to the genus Pyrus. Another injurious species attacking the plum tree in the Niagara district is the Plum Twig Gall mite, *Eriophyes phlœocoptes.* It is an European species which has been imported into this country within recent years. The mites form small subspherical galls in clusters at the base of the buds. Pocket-like galls belonging to the genus Eriophyes are found on the leaves of the cherry, plum, and grape. Two species of red spider, *Tetranychus telarius* and *Bryobia pratensis,* are found on the under side of the leaves of the plum, pear and apple, and when in large numbers, as they usually are in dry seasons, they do a considerable amount of injury to the common fruit trees. One species confines its ravages to the secretions on the surface of the apple. The red spider is also found on the raspberry. On currant bushes in England a species known as the Black Currant Gall mite, *Eriophyes ribis,* has long been known to horticulturists in that country, and as it is spreading rapidly in England and other countries, its presence here may be expected any day. In shape this particular species is easily recognized by the distinct globular or swollen-like appearance of the buds. When the buds are badly attacked they never open into leaf, but for a time they retain their green colour, later becoming brownish, dry, gall-like bodies, more or less open at the apex. Another species of considerable economic importance in the tropics is *Eriophyes oleivorus,* the rust mite of the orange and the silver mite of the lemon. It occurs in California and lives on both leaves and fruit. On the foliage the mite causes the leaves to become curled and to lose their gloss. On the fruit of the orange the mite produces a hardening of the rind, which becomes brownish in colour. The infested orange, although injured in appearance, is better able to stand long shipment and is more juicy than the clean fruit. Upon the lemon the mites cause the rind to become silvered, the fruit is better for shipment but the rind is injured for commercial purposes.

As Pests of Farm and Garden Crops.

As enemies to the growing grain and also to stacked roots such as turnips, carrots, mangels, potatoes, and even ensilage, mites are considerably destructive. Yet they are not responsible for so much damage as they are often credited with. In the field the Clover mite, *Bryobia pratensis,* is of most importance, attacking clover and other leguminous crops. Another species is found on Timothy and causes distortion of the inflorescence. In the root cellars there are hosts of species too numerous to mention, some parasitic, some saprophytic, and a few finding it a favourite place to live, but doing no harm.

As Pests of Vegetable Crops.

Only a few species have been found, but the enormous numbers of individuals make up for the fewness of the species. Myriads of Tetranychids are found feeding on the leaves, and the Tyroglyphids are everywhere present on the stored roots. *Tetranychus telarius* is the most common species on the outside crop, and *Tyroglyphus longior* and *Gamasids* are most troublesome inside.

As Pests of Shade Trees and Ornamental Shrubs and Herbs.

Scarcely a tree or shrub escapes the attacks of one or more of these species. Some indeed, such as the maples, have as many as twenty-five or more species, feeding and absorbing nourishment from the leaves, twigs, bark, stem and roots. Most of the injuries of the trees are due to species of the Eriophyidæ, but in case of the shrubs and herbs the Tetranychids do most damage. The type of injury on the trees takes the form of galls. These are beautiful structures and at certain seasons of the year where they are not too abundant, appear more ornamental than destructive. As examples of these might be mentioned the Top Gall of the Soft Maple, the Pocket Gall of the Basswood, the Frost Gall (Erineum) of the Maple and Beech. On the shrubs we find the Tetranychus species again in evidence—the Privet, Garden Bell, Lilac, Spirea, Roses and Dogwoods. Among the ornamental herbs that suffer most from the attacks of Tetranychids are the perennial Phlox, Petunias, Nasturtium and Malva.

As Pests of Forest Trees.

The Ontario forest flora affords suitable hosts for over fifty species of gall-making mites. A few of the more important ones have been discussed under Shade Tree Pests, but a large number of the species are not met with except on forest trees. These variously shaped galls are found on the flowers, fruits, leaves, twigs, and stems of such trees as the Elms, Poplars, Willows, Oaks, Chestnuts, Hawthorns, Maples, Lindens, etc. They not only do injury to the development of the tree but cause unsightly vegetable deformities sometimes literally covering the tree. The Witches Broom of the Hackberry, Willow, etc., is also the result of the work of these mites. Much difficulty is experienced in treating the trees for these pests as they are protected by the tissue of the gall which forms around them. The lime-sulphur wash which is found most effective for the Pear-Leaf Blister mite is about the best remedy where it is practicable to spray. Red Spiders of the Tetranychus genus almost equal the Eriophyes in abundance on forest trees. Only a few species have been determined but the excessive numbers of these species which are found make up for the fewness of the species. When closer study is made of this genus, it is altogether likely that a far larger number of species will be discovered. *Tetranychus spinosa*, which is found on the Linden on the upper side of the leaves is often sufficiently abundant to consume the whole of the chlorophyll, changing the appearance of the tree from green to yellow in midsummer. *Tetranychus bicolor* produces the same effect on leaves of Oaks and Hawthorns as *T. spinosa* does to the Linden. *T. telarius* is also found on the leaves of many forest trees.

As Greenhouse Pests.

The florist is only too familiar with the work of the Red Spider and the Bulb mite, which are invariably present in large numbers attacking most of his flower-

ing plants. Two species of Red Spider, *Tetranychus bimaculatus* and *T. telarius*, are the common species of the greenhouse of Ontario. They are found on such plants as primulas, chrysanthemums, carnations, cinerarias, tomatoes, etc. The bulb mite, *Rhizoglyphus hyacinthi*, is responsible for an enormous amount of damage in hothouses. They burrow into the healthy tissue, thereby giving a chance to the destructive soil bacteria to bring about decay. It is found on hyacinths, narcissus, orchids, and other bulbous plants. Affected bulbs should be burned as soon as the mite is discovered. *T. pallidus* is sometimes found on leaves of Chrysanthemum and *Rhizoglyphus heteromorphus*, which cause injury to the stems of carnations, are found in New York state. Other species are found on the pistil of Banana flowers in the tropical greenhouses, and on the leaves of Latania palm.

As Pests of Flour Mills, Stores, Etc.

Flour mills, grocery stores, drug stores, butcher shops, libraries, laundries, restaurants, confectioneries, seed stores, furriers and furniture stores all afford hospitality to a species or more of Acarid. The flour mites, *Aleurobius farinae* and *Tyroglyphus longior* are the chief pests of the flour mill, the grocery store, the seed store and confectionery store. The sugar mite, *Carpoglyphus passularum* is chiefly found on raw sugar.

II.—CLASSIFICATION.

The mites belong to the Phylum Arthropoda, to the class Arachnida and to the order Acarina. In a general way mites are readily identified by their one-piece or sac-like bodies, but a much greater difficulty is encountered when it comes to differentiate them from their allies, the spiders and scorpions. Scorpions have segmented bodies and spiders have a marked constriction between the cephalothorax and the abdomen, and when these characteristics are present they can be easily separated from the Acarids. They are mostly very small and some are even microscopic. It has been found that in the embryo eight legs are present, but at birth and during larval development they have only six, and after moulting a few times develop a fourth pair. Exceptions are found in the large family, Eriophyidæ—the worm-like mites—where they have but two pairs throughout life. The legs are provided with hairs and spines, sometimes much modified, fitting them for special adaptations in life. In some groups organs are found on the anterior legs which are supposed to be sensory. The last joint of the leg is commonly terminated by from one to three claws. The mouth parts take the form of a truncate cone or beak, and in some families it is partially or completely reversible. The mandibles and palpi are of various types and peculiarly modified according to the habits of the mite. In some families there is a lingula or tongue which is usually not visible except by careful examination, but in the Ixodidae it is large and roughened with sharp teeth. On the cephalothorax there are usually one or more pairs of simple eyes which are sometimes elevated on short pedicels. The reproductive organs open on the ventral surface of the abdomen, and in this respect they are like their relatives, the Arachnids.

Family Eupodidae.

Only three species have been found in Ontario. In chopped grain, under bark of wood and under boards are the principal habitats of this family. They are predaceous, soft-bodied, small mites with very long legs, and mandibles cheylate like their relatives, the Cheyletidæ. In many respects they are primitive in that they possess characters similar to those of the spiders.

Eupodes variabilis. Found abundant on barley seed in experimental grain cellar. T. D. J., Guelph.

Eupodes sp. Found under bark of Ironwood associated with other sp. of mites. T. D. J., Guelph.

Linopodes attenuipes Bks. Found under boards on College campus. T. D. J., Guelph.

Family Bdellidæ.

There are also three species of this family found in Ontario. Under bark of balsam, crabapple, soft maple, apple, hard maple, in mangel seed, cavities of stone and in ground spelt in Experimental grain cellar, are some of the places inhabited by this family. They are closely related to the Eupodidæ and Chevletidæ in that they are predaceous with cheylate mouth parts and cephalothorax partially distinct from the abdomen. They are red in colour with long, slender legs and a well developed beak or rostrum.

Bdella cardinalis, Banks. Under bark of Balsam, Abies balsamæ, Crabapple, Soft Maple, Pyrus sp. In cavities in stone. T. D. J., Guelph.

Bdella tenella, Banks. Under bark of Hard Maple. In Mangel seed in the Experimental grain cellar. T. D. J., Guelph.

Bdella sp. Found in ground Spelt in Experimental grain cellar. T. D. J., Guelph.

Family Cheyletidæ.

This family is more or less largely represented in the Ontario fauna, containing eight species, some parasitic and predaceous upon birds, rodents, and insects. Other predaceous species may be found almost anywhere in search of mites and other insects. They are characterized by having very large palpi and are distinguished from the previous families by the absence of the demarcation between the cephalothorax and the abdomen.

Myobia caudata, Banks. Abundant on little brown bat. T. D. J., Guelph.

Myobia musculi, Derges. Found in abundance very closely attached to the hairs of the house mouse. T. D. J., Guelph.

Cheyletes pyriformis, Banks. Found on larvæ of Codling Moth in winter nest. T. D. J., Guelph.

Cheyletes longipes, Banks. Several specimens found in gelatin culture in Bacteriological laboratory. T. D. J., Guelph.

Cheyletes clavispinus, Banks. Several specimens were taken under bark of lilac. T. D. J., Guelph.

Cheyletes ferox. In hay, Ontario Agricultural College Barns. Mangel seed, Experimental office. Grain in grain cellar. Barley seed, O. A. C. barn. Ground Spelt, Experimental Department.

Cheyletielle Canadensis, Banks. Found on Bluebird, Sialia sialis. T. D. J., Guelph.

Sorergates sp. Parasite on house and field mouse in cavities or little cells just beneath the skin. J. B. T., Ottawa.

Family Tetranychidae.

Five species of this family have been found in Ontario up to the present time. These are distinguished from the three preceding families by being fitted for existence entirely on vegetable matter. Trees, shrubs, and herbs are usually infested with one or more species of this family. Both sides of the leaves are attacked by mites of this family, probably the under side being their most favourite resort. Greenhouse plants as well as outdoor plants are subject to their attacks. Several species are capable of spinning a silken thread and weaving a home, and from this habit are called spinning mites. The commoner species are red in colour and from this they get the name of "red spiders." Other species are found in green, brown, and mottled colours. They all have one or two conspicuous ocelli on the cephalothorax and the body and legs usually have a few long scattered hairs.

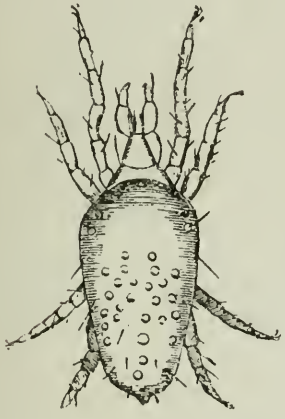


Fig. 22. Tetranychus telarius—"Red Spider."

Fig. 23. Trombidium irritans —Harvest-mite.

Tetranychus telarius, L. (Fig. 22). Found under bark of Buckthorn (Rhamnus catharticus), Crabapple (Pyrus sp.). Cultivated Alder (Alnus glutinosa). T. D. J., Guelph.

Tetranychus bicolor. Feeding on upper side of leaf of Hawthorn (Cratægus) and Burr Oak (Quercus macrocarpæ). T. D. J., Guelph.

Tetranychus spinosa. On leaves of Basswood (Tilia americana). T. D. J., Guelph.

Bryobia pratensis. In houses. On window pane of Experimental basement, Ontario Agricultural College. On clover and plum. T. D. J., Guelph.

Tetranychus bimaculatus. In greenhouse. T. D. J., Guelph.

Family Rhyncholophidæ.

Four species occur in Ontario, all belonging to the genus Rhyncholophus. They are of much economic importance since most of our species are predaceous on scale insects. Most of our species are red in colour and possess very long legs.

Rhyncholophus pilosus. Feeding on eggs of Ichneumon; a parasite on Cecropia moth; found at base of old stump in woods; on apple tree feeding on Canker worm; on large black willow and other trees running over leaves in search of insects. T. D. J., Guelph.

Rhyncholophus parvus, Banks. Under leaves in woods. T. D. J., Guelph.
Rhyncholophus sp. Feeding on San José Scale. T. D. J., Guelph.
Rhyncholophus sp. Feeding on New York Plum scale. T. D. J., Guelph.

Family Trombidiidae.

Although only three species have been studied, one of them, *Microtrombidum locustarum,* is of great importance, as it is parasitic upon the eggs and adults of locusts. The "Harvest mites," as they are popularly called, are recognized by

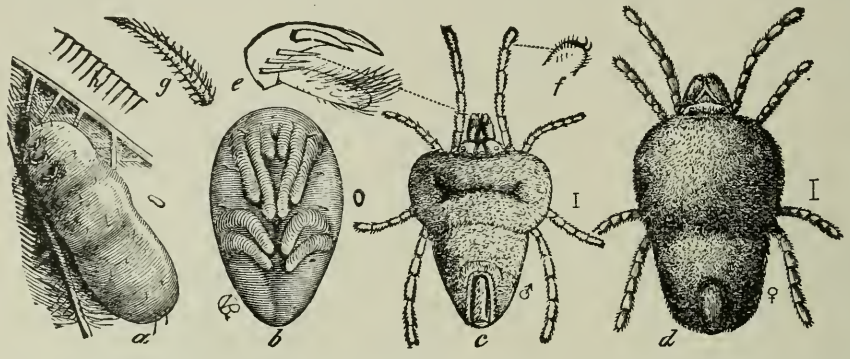


Fig. 24. Trombidium locustarum.—(*a*) mature larva, when about to leave the wing of a locust; (*b*) pupa; (*c*) male adult fresh from the pupa; (*d*) female—the natural sizes are indicated by the short lines on the right; (*e*) palpal claw and thumb; (*f*) pedal claws; (*g*) a barbed hair; (*h*) the striations on larval skin (after Riley).

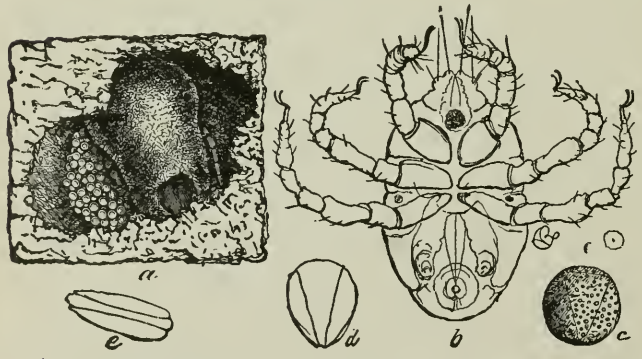


Fig. 25. Trombidium locustarum.—(*a*) female with her batch of eggs; (*b*) newly-hatched larva—natural size shown by the dot in a circle on the right; (*c*) egg; (*d, e*) empty egg-shells (after Riley).

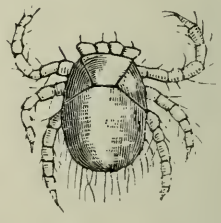


Fig. 26. Dermanysus avium.

the body being divided into two parts, the anterior the smaller and the posterior the larger. (Fig. 23). They are always red in colour and most of them quite large. The body is covered with a compact mass of bristles or branched hairs which gives them a velvet-like appearance.

Trombidium sericeum, Say. On decayed log; cedar moss. T. D. J., Guelph.

Microtrombidium locustarum, Say. (Figs. 24 and 25). Parasitic on several species of locust in all parts of Ontario. T. D. J., Guelph.

Trombidium sp. On eggs of Forest Tent Caterpillar.

Family Hydrachnidae.

Many species belonging to this family have been obtained by means of the aquatic mite trap, but so far only two species have been identified. They are closely related to the Trombidiidæ, but are distinguished from them by means of their flattened and hairy legs and other adaptations for their aquatic existence. The young of this family are usually parasitic on water bugs and beetles, but the adults, as a rule, live free in the water.

Hydrachna belostomae, Ric. Attached to ventral surface of electric light bug. T. D. J., Guelph.

Hydrachna sp. Gills of Fresh Water Mussel. T. D. J., Guelph.

Family Ixodidæ.

Five species of this family have been found in Ontario. They are the largest of the mites and most familiar to ordinary people. The body is covered by a tough leathery skin, which in the female when filled with eggs is shown to be quite elastic by its great distension. They are usually known as ticks and are frequently parasitic upon birds, reptiles, turtles and mammals. Their chief importance is that they are transmitters of disease of man and domestic animals.

Ixodes Marxi, Banks. On Red Squirrel. T. D. J., Guelph.

Ixodes Cooki, Pack. On Groundhog. T. D. J., Guelph.

Boophilus bovis, Riley. On imported cattle. T. D. J., Guelph.

Dermacentor variabilis, Say. Dog tick. T. D. J., Guelph.

Dermacentor albipictus, Pack. Taken from moose. T. D. J., Northern Ont.

Family Gamasoidæ.

Over thirty species are included in the Ontario fauna. Their habitat is of the most varied character of all the Acarids, some parasitic, some predaceous, some vegetarians, and some scavengers. The anatomy of this family is also very much varied. Some have a hard cariaceous integument, others again are quite soft bodied. Their legs are short and usually flat and broad.

Gamasus attenuipes, Banks. Feeding on turnip in Ontario Agricultural College root cellar. T. D. J., Guelph.

Gamasus posticatus, Banks. Under decaying maple leaves in College wood lot. T. D. J., Guelph.

Gamasus sp. Abundant in Ontario Agricultural College herbarium on pressed specimens of Pear-leaf Blister-mite. T. D. J., Guelph.

Gamasus sp. On decaying squash in Ontario Agricultural College garden. T. D. J., Guelph.

Gamasus sp. Under decaying tree in Ontario Agricultural College wood lot. T. D. J., Guelph.

Gamasus sp. Abundant on fruiting bodies of Brown Rot of Cherry (Sclerotinia fructigena). T. D. J., Grimsby, Ont.

Gamasus sp. Under decaying hard maple leaves in Ontario Agricultural College wood lot. T. D. J., Guelph.

Gamasus sp. In gall of Eriophyes on Aspen. T. D. J., Guelph.

Gamasus sp. In horse manure at Ontario Agricultural College. T. D. J., Guelph.

Gamasus sp. On sugar beet in Ontario Agricultural College root cellar. T. D. J., Guelph.

Gemasus sp. Common or Red Squirrel, Ontario Agricultural College. T. D. J., Guelph.

Gamasus sp. Under New York Plum Lecanium on Elm, Ontario Agricultural College. T. D. J., Guelph.

Gamasus sp. In Pine cone. T. D. J., Guelph.

Gamasus sp. Abundant on body of Leopard Frog. T. D. J., Guelph.

Gamasus sp. On stored celery in College cellar. T. D. J., Guelph.

Lælaps pedalis, Banks. On Chipmunk, Ontario Agricultural College. T. D. J., Guelph.

Lælaps multispinosus, Banks. Very abundant on Muskrat, Ontario Agricultural College. T. D. J., Guelph.

Liponyssus Canadensis, Banks. On English sparrow; Meadow Lark; Kingbird; Wood Pewee; White Bellied Nuthatch; Red-eyed Vireo. T. D. J., Guelph.

Lælaps longisita, Banks. Carrion beetle, Ontario Agricultural College. T. D. J., Guelph.

Lælaps propheticus, Banks. Groundhog, Ontario Agricultural College. T. D. J., Guelph.

Sejus macrophilus, Banks. Predaceous; found in gall of genus Eriophyes of Large-toothed Aspen. T. D. J., Guelph.

Dermanyssus gallinae, Redi. Abundant on domestic fowl. Guelph and all through the province. T. D. J., Guelph.

Dermanyssus avium (Fig. 26). Domesticated caged birds. T. D. J., Guelph.

Cælænopsis latus. Attached to beetle (Passalus cornutus). T. D. J., Guelph.

Liponyssus sp. On Star-nosed Mole. T. D. J., Guelph.

Caelaenopsis pedalis, Banks. Attached to larvæ of Spotted Pelidnota. T. D. J., Guelph.

Uropoda sp. On mangel seed in Experimental basement. T. D. J., Guelph.

Uropoda sp. On leaves of Rananculus acris. T. D. J., Guelph.

Uropoda sp. On Rough Osmoderma; Long-horned Borer; Skin Beetle; Horned passalus; Tumble Bug; Tenebrio. T. D. J., Guelph.

Macrocheles sp. On Horned passalus; Carrion beetle; Large Silpha. T. D. J., Guelph.

Lælaps sp. On Mangel in Ontario Agricultural College root cellar. T. D. J., Guelph.

Liponyssus sp. Attacking dipterous larva feeding on samara of Silver Maple. T. D. J., Ontario Agricultural College. Guelph.

Lælaps sp. On White-bellied Nuthatch. T. D. J., O.A.C., Guelph.

Dermanyssus sp. Abundant on Screech Owl. T. D. J., Guelph.

Family Oribatidæ.

This family is also well represented in our fauna, containing about twenty-four species. They are often called Beetle mites on account of their horny-like integument which in appearance is like the elytra of the Coleoptera. The food of the Oribatidæ is mostly of a vegetable nature, but some species are found on decaying matter and others again on the eggs of scale insects. Their habitat varies very considerably. Some are found under the bark of trees, others on stacked roots, in cavities of stones, on gall tissue, under boards, on decaying leaves, in moss

and various other places. They can easily be recognized by a bristle arising from a small indentation on the posterior corners of the cephalothorax, and abdomen is well marked. The mouth parts are obscure and the palpi very small. An interesting thing about this family is the manner in which some of the nymphs collect and carry moulted skins, dirt, moss, etc., on their backs. The shapes and appendages of this family are strikingly peculiar in many species.

Galumna emarginata, Banks. In cavities in stone. T. D. J., Guelph.

Galumna moesta, Banks. Cavities in stone. On mangels in root cellar, O.A.C. Turnip in root cellar, O.A.C. T. D. J., Guelph.

Nothrus excisus Banks. Under bark of Austria Pine and Norway Spruce T. D. J., O.A.C., Guelph.

Oribatella pallida, Banks. Under bark of Hard Maple, Norway Spruce, Apple, Crab Apple. T. D. J., Guelph.

Hoploderma granulata, Banks. Harrington, Ottawa.

Oribatella formosa, Banks. Under bark of Catalpa, Norway Spruce, Lombardy Poplar, Mountain Ash. T. D. J., Guelph.

Eremaeus pilosus, Banks. Under bark of Catalpa, Buckthorn, Balsam, Cut-leaved Alder, Austria Pine, Mountain Ash. T. D. J., Guelph.

Galumna affinis, Banks. Under board on College campus. T. D. J., Guelph.

Galumna depressa, Banks. On turnip and mangel, in O.A.C. root cellar. T. D. J., Guelph.

Oribata depressa, Banks. On mangel in O.A.C. root cellar. T. D. J., Guelph.

Galumna hirsuta, Banks. Under bark of walnut. T. D. J., Guelph.

Galumna sp. Under Lecanium scale. T. D. J., Guelph.

Oribata sp. In cavities in stone. T. D. J., Guelph.

Nothrus sp. Under bark of Soft Maple. T. D. J., Guelph.

Oribata sp. On large fungus gall of grape. T. D. J., Niagara Falls.

Pelops terminalis. Under bark of Ironwood. T. D. J., Guelph.

Notaspis Burrowski, Nuch. Western Ontario. T. D. J.

Notaspis Canadensis, Banks. W. H. Harrington, Ottawa.

Galumna sylvicola. Among fallen leaves in the forest. T. D. J., Guelph.

Liacarus panulus. From moss on a stump. T. D. J., Guelph.

Oribata Canadensis. Under bark of Ironwood. T. D. J., Guelph.

Oribata perolota. In corn stubble. T. D. J., Guelph.

Oribata neosota. From decayed leaves. T. D. J., Guelph.

Cymberemaeus parvula. Under bark of Ironwood. T. D. J., Guelph.

Family Tyroglyphidæ.

We have found ten species in our fauna. They are great destroyers of property, for, although very minute in size, their enormous numbers make up for their minuteness. The list of species tabulated below will give some idea of the varied habits and habitat of this family. The hypopol stage is a resting one, and at this period in their life history they often attach themselves to other animals, but as the mites do no feeding at this time they cannot be called true parasites. In this stage their chief object is to migrate to new feeding grounds. They are usually pale coloured or slightly tinted with pink, with soft bodies and prominent cheylate mandibles. There are no eyes and no special breathing organs.

Tyroglyphus longior, Germans. In all parts of houses. On cheese in cheese factories, barley seed, whole wheat, turnip and mangel in O.A.C. root cellar; bulb of Gladiolus; under Oyster-shell scale. T. D. J., Guelph.

Tyroglyphus siro, Linnaeus. (Fig. 27.) On cheese in cheese factories in various parts of the Province. Smoked hams. T. D. J.

Tyroglyphus Americanus, Banks. In test tube of Bacteriological laboratory. In jar of raspberry jam. T. D. J., Guelph.

Rhizoglyphus hyacinthi, Bos. Bulb of Gladiolus, common Daffodil. T. D. J., Guelph.

Rhizoglyphus rhizoglyphus, Banks. On hay, O.A.C. barn; decaying potatoes and parsnips, decaying heart of celery. T. D. J., Guelph.

Rhizoglyphus phylloxeræ, Riley. (Fig. 28.) On turnip in root cellar, Guelph; on decaying heart of celery, Guelph; on roots of grape, London. T. D. J., Guelph.

Carpoglyphus passularum, Hr. On raw sugar from store in Guelph; on smoked ham in pork packing house. T. D. J., Guelph.

Histiostoma muscarum. Attached to housefly. T. D. J., Guelph.

Histiostoma valida, Banks. In horse manure, Guelph. T. D. J., Guelph.

Aleurobius farinae. Fairly common in flour in flour mills. T. D. J., Guelph.

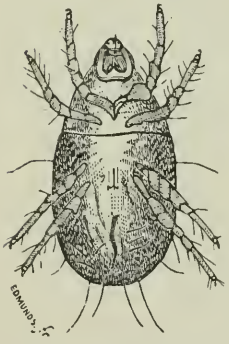


FIG. 27. Tyroglyphus siro—Cheese mite.

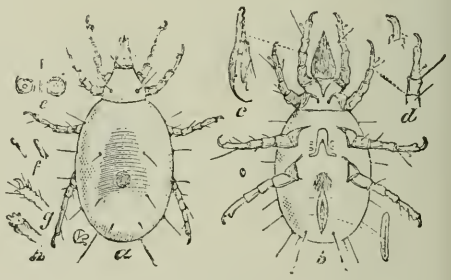


FIG. 28. Rhizoglyphus phylloxeræ.

FAMILY CANESTRINIDÆ.

Only one species so far found in Ontario. It, however, is of much economic importance, as it is predaceous upon the San José Scale. They are small, short-legged mites, closely related to the Sarcoptidæ and also apparently to the Tyroglyphidæ.

Hemisarcoptes malus, Sch. San José Scale, St. Catharines. T. D. J.

FAMILY ANALGESIDÆ.

Forty-three species have been taken in this Province. They inhabit the feathers of birds and apparently do little or no injury to the host. They are extremely small and found in great abundance on the feathers of the wings and other parts of the bird. W. R. Thompson, B.S.A., of the Gypsy Moth Laboratory of Boston, has made a special study of the anatomy and characteristics of this family in Ontario, using the collection of the writer. In this connection I wish to emphasize the patient and painstaking work of Mr. Thompson on this family, while a pupil of the Zoological Department of this College. A full list of these species will be published in the annual report of this Society for 1910.

Family Listrophoridae.

These are closely related to the bird mites and live upon mammals. Our species was found on the muskrat. They also are small, soft-bodied mites, with short legs terminating in a sucker. Similar to the bird mites they feed upon the hairs of the small mammals.

Listrophorus validus, Banks. Taken from muskrat. T. D. J., Guelph.

Family Sarcoptidae.

These are the itch mites of man and domestic animals, birds, etc. They, in some cases, burrow within the skin and thereby produce intense itching, and in many cases a diseased condition of the host, commonly known as scabies or mange. The mites are very small, white and semi-globular in shape. Several species of this family have been found in Ontario.

Sarcoptes scabies, Itch mite. (Figs. 29 and 30.) Host, horses. Ontario, T. D. J., Guelph.

Fig. 29. Male Itch Mite.

Fig. 30. Tunnel of Female Itch Mite beneath the skin—adult at left end, eggs throughout the tunnel.

Chorioptes symbiotes, var. equi, Verheyen. On legs of horses. T. D. J., Guelph.

Chorioptes symbiotes, var. *bovis.* On cattle. T. D. J., Guelph.

Psoroptes communis, Furst. On sheep. Manitoulin Island. T. D. J.

Family Eriophyidae.

This is a family of microscopic mites, which are quite curious and unusual in structure. They have only two pairs of legs and the abdomen is long and striated. These striations, which differ in the different species and differ in number on the dorsal and ventral surfaces, are of considerable importance in the classification. The galls produced vary in form, but are always open or provided with an opening through which the mites pass in and out. They are generally lined with minute hairs (trichomes), which may be simple or branched. The different types of Eriophyid galls are shown in figures 31 to 39. Sixty-six species occur in Ontario.

FIG. 31. Erineum on leaf of beech ; natural size and highly magnified.

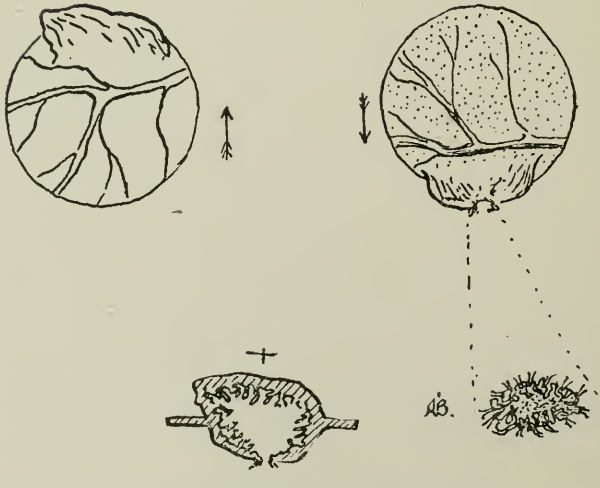


FIG. 32. Capsule Gall : Upper and lower surfaces ; interior and opening of capsule, highly magnified.

HOST—ALDER.

Eriophyes sp. A white, frost-like erineum on under side of leaf in the axils of the veins. Trichomes dense, pellucid. (Fig. 31.) Alnus incana. T. D. J., Guelph.

Eriophyes sp. A small, red or green pubescent pocket gall on leaf. Alder Pocket Gall. (Fig. 34.) Alnus incana. T. D. J., Guelph.

HOST—ASH.

Eriophyes fraxini (Garman). Small, irregular, smooth, more or less spherical capsule gall, protruding on both sides of the leaf. Ash Mite Gall. (Fig. 32.) Fraxinus americana. T. D. J., Guelph.

Eriophyes sp. Pinkish-white, elongated capsule galls on the veins of the leaf. Ventrally the galls appear as white, hairy projections following the veins. Ash Vein Gall. T. D. J., Guelph.

Eriophyes sp. A deformation of the terminal buds, their development arrested, producing a mass of small twisted leaf ends. Fraxinus americana. (Fig. 37.) T. D. J., Guelph.

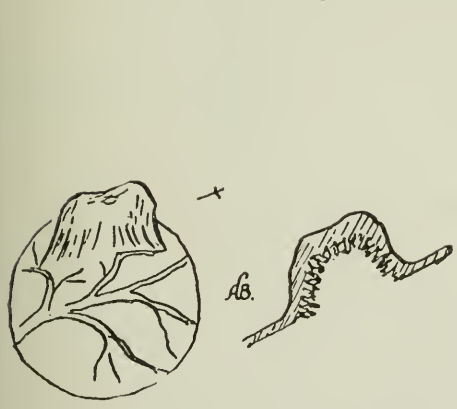


FIG. 33. Dimple Gall and section of interior greatly magnified.

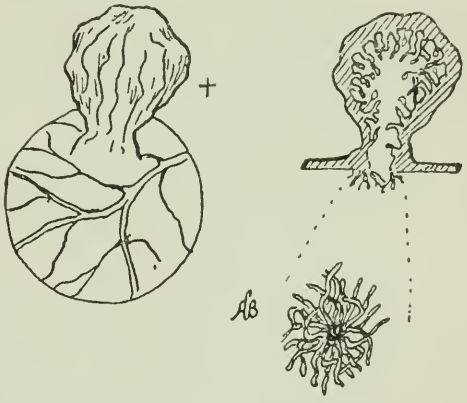


FIG. 34. Pocket Gall: Upper surface of leaf; interior of gall, much magnified.

Eriophyes sp. Leaves dwarfed and distorted in a bundle. Resembles somewhat Cecidomyia solidaginis. Ash Bunch Gall. Fraxinus americana. T. D. J., Guelph.

Eriophyes sp. Small, irregular, more or less spherical capsule gall, protruding on both sides of leaf. Galls hairy. Fraxinus pubescens. T. D. J., Guelph.

HOST—BASSWOOD.

Eriophyes abnormis, Garman. Balloon-shaped galls on the upper surface of the leaf. Apex of gall usually serrated. Basswood Balloon Gall. Tilia americana. T. D. J., Guelph.

Eriophyes sp. Irregular, circular, dark reddish-brown spots 4-5 mm. in diameter, having in their centre very characteristic tufts of whitish hairs. Basswood Tufted Gall. Tilia americana. T. D. J., Guelph.

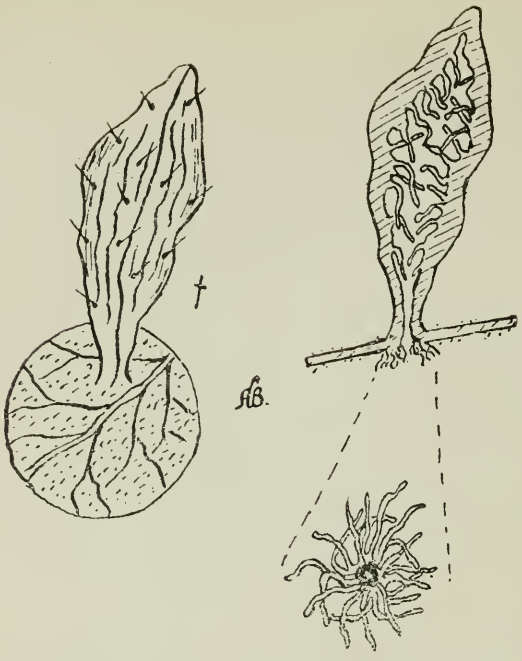


FIG. 35. Pouch Gall on upper surface of leaf; interior of gall, much magnified.

FIG. 36. Leaf-margin Gall.

FIG. 37. Leaf-distortion Gall, different stages.

Eriophyes sp. A white erineum or shallow dimple on underside of leaf, much like the Erineum on Acer negundo. Tilia europea. T. D. J., Guelph.

HOST—BEECH.

Eriophyes sp. A frosty, white erineum in large patches on the under side of the leaf. Trichomes spherically capitate. Fagus americanus. T. D. J., Guelph.

HOST—BIRCH.

Eriophyes sp. A bud deformation, crowded and irregular, often in bunches of large size. Birch Bud Gall. (Fig. 38.) Betula lutea. T. D. J., Guelph.

Eriophyes sp. A rosy-pink erineum in large patches on the upper side of the leaf. Betula lenta. T. D. J., Guelph.

FIG. 38. Bud-like Galls.

FIG. 39. Serpentine Gall.

Eriophyes sp. A yellowish-white to brownish erineum forming large patches between the ribs on the under side of the leaf. Betula papyrifera. T. D. J., Guelph.

Eriophyes sp. A transparently white, granular erineum on the surface of the leaves. Betula pumila. T. D. J., Guelph.

Eriophyes sp. A capsule gall, very small, yellow to brown. Paper Birch Capsule Gall. (Fig. 32.) Betula papyrifera. T. D. J., Guelph.

Eriophyes sp. A nodular pocket gall, occurring upon both faces of the leaf; yellowish, or reddish to purplish. Paper Birch Pocket Gall. Betula papyrifera. (Fig. 34.) T. D. J., Guelph.

HOST—BUTTONBUSH.

Eriophyes cephalanthe (Cook). Clusters of small dimples on the upper side of the leaf, 1 to 3 mm. high. Buttonwood Dimple Gall. Cephalanthus occidentalis. T. D. J., Guelph.

HOST—CHESTNUT.

Eriophyes sp. A small, capsule gall on the leaf, more or less spherical and 2-3 mm. in diameter. Chestnut Capsule Gall. Castanea sativa, var. americana. T. D. J., Guelph.

HOST—ELM.

Eriophyes ulmi (Garman). Small green to yellowish pocket-galls, more or less spherical, usually on the upper side of the leaves. Elm Pocket Gall. (Fig. 34.) Ulmus americana and U. racemosa. T. D. J., Guelph.

Eriophyes sp. An erineum on the under side of the leaf; white at first, changing to brown. Trichomes simple, tangled. Rock Elm Erineum Gall. Ulmus racemosa. T. D. J., Guelph.

Eriophyes sp. A very large pouch-gall on the leaves, commencing as a cone or deep dimple. (Fig. 35.) Ulmus pubescens. T. D. J., Guelph.

HOST—GRAPE.

Eriophyes sp. A white erineum on the underside of the leaf. Trichomes simple. Wild Grape. T. D. J., Guelph.

Eriophyes sp. Small, semi-circular or nearly circular capsules along the veins, about 2 mm. in diameter, and but slightly elevated on either surface. On upper surface paler than the leaf; below, with a white nipple surrounded by a furrow. Vitis cordifolia. T. D. J., Guelph.

HOST—HAWTHORN.

Acarus crataegi vermiculus. A fold of the leaf making long, irregular, wavy projections on the upper surface of the leaf. From the midrib to the edge of the leaf in the general direction of the gall. Serpentine Gall. Cratægus sp. T. D. J., Guelph.

Eriophyes sp. Small, round swellings (capsules) protruding very slightly on both sides of the leaf. About .5-1 mm. in diameter. Galls very numerous where they occur—sometimes more than 100 on a single leaf. Speck Gall. Cratægus sp. T. D. J., Guelph.

Eriophyes sp. Very small, monothalmous, conical structures, 1 to 2 mm. high and 1-1.5 mm. wide at the base; formed anywhere on either surface of the leaf and sometimes on the stem of young twigs. Cone Gall. Cratægus sp. T. D. J., Guelph.

HOST—HAZEL.

Eriophyes sp. This gall is found only along the main veins of the leaf. The part of the leaf around the affected portion of the vein becomes crimped, the crimps all radiating towards the vein as a common centre. Hazel Leaf Crimp Gall. Corylus americana. T. D. J., Guelph.

Eriophyes avellanae. A bud deformation, which attacks bud as soon as it expands, and checks its subsequent development. Hazelnut Bud Gall. Corylus americana. T. D. J., Guelph.

HOST—GENUS JUGLANS.

Eriophyes sp. A brown, velvety erineum surrounding the leaf stalks, or on the main veins, causing a swelling or bending of the stalk or vein. Walnut Cushion Gall. Juglans nigra and probably J. cinerea. T. D. J., Guelph.

Eriophyes sp. A green pocket-gall on the upper side (usually) of the leaf. Walnut "Wart" Gall. Juglans nigra and probably J. cinerea. T. D. J., Guelph.

HOST—JUNEBERRY.

Eriophyes sp. Small, nearly globular, dark brown, pocket galls, averaging 2 mm. in diameter, singly or in clusters on the upper side of the leaf. Juneberry Ball Gall. Amelanchier rotundifolia. T. D. J., Guelph.

HOST—MAPLE.

Eriophyes sp. A whitish frost-like erineum with scattered spots of rosy-pink, on the upper surface of the leaf, sometimes nearly covering it. Acer rubrum. T. D. J., Guelph.

Eriophyes sp. A pale yellow or white erineum on the under side of the leaf. Trichomes capitate. Acer saccharinum. T. D. J., Guelph.

Phlœoptes quadripes. A nearly spherical pocket gall on the upper surface of the leaf, varying from light green through red or purple to black. Acer saccharinum. T. D. J., Guelph.

Eriophyes sp. A white or whitish erineum in patches on the under side of the leaf, often limited by the veins. Trichomes capitate. When old, the trichomes assume a brown colour. Acer saccharum. T. D. J., Guelph.

Phlœoptes aceris. A green, reddish or purplish, slender, pouch-gall projecting from the upper surface of the leaf. Acer saccharum. T. D. J., Guelph.

Eriophyes sp. A white or whitish erineum on the under side of the leaf. Acer nigrum. T. D. J., Guelph.

Eriophyes sp. Irregular wart-like swellings (Dimple) on the upper surface of the leaf. The swellings are green at first and turn gray when mature. The average diameter is about 3 mm. Manitoba Maple Wart Gall. Acer negundo. T. D. J., Guelph.

Eriophyes sp. A white, whitish, or pale yellow erineum on the under side of the leaf, in patches often in the axils of the veins. Trichomes long, tangled and distorted. Acer spicatum. T. D. J., Guelph.

HOST—OAK.

Eriophyes querci. An irregular dimple upon the blade of the leaf. From beneath it appears as an irregular cavity, lined with a tangled mass of white vegetable hairs. Oak Dimple Gall. Quercus macrocarpa. T. D. J., Guelph.

Eriophyes sp. A dense mat of brown hairs growing in large patches upon the under side of the leaves. Oak Hair Gall. Quercus sp. T. D. J., Guelph.

HOST—POPLAR.

Eriophyes sp. Circular, flat or slightly convex, frost-like patches varying from 2-3 mm. in diameter, on the upper side of the leaf. Large-toothed Aspen Frost Gall. Populus grandidentata. T. D. J., Guelph.

Eriophyes sp. Circular depressions dimple always on the lower side of the leaf. On the upper side it appears as a reddish circular elevation. Large-toothed Aspen Convex Gall. Populus grandidentata. T. D. J., Guelph.

Eriophyes sp. Dimple-like galls on the upper side of the leaf of the Aspen. Aspen Dimple Gall. Populus tremuloides. T. D. J., Guelph.

Eriophyes sp. Irregular tubercular masses of closely-packed small reddish-green protuberances on the stem. Unsightly Poplar Gall. Populus tremuloides.

Eriophyes sp. A depression on the lower surface of the leaf, 4-12 mm. in diameter and 2-5 mm. in depth. Under surface of gall is orange-yellow. Populus italica. T. D. J., Guelph.

Eriophyes sp. Margin of leaf distorted and curled. Populus tremuloides. T. D. J., Guelph.

Host—Genus Prunus.

Eriophyes sp. Reddish, slender pouch-galls, somewhat irregular and pubescent, ¾ mm. long and .5-1 mm. in diameter. Pin Cherry Pouch Gall. Prunus pennsylvanica. T. D. J., Guelph.

Eriophyes sp. Green on rosy-red pouch-gall on the upper side of the leaf .5-6 cm. in length. The gall is constricted about half way to the leaf. Black Cherry Pouch Gall. Prunus serrotina. T. D. J., Guelph.

Eriophyes sp. Green or reddish pouch gall on the upper side of the leaf, differing from the Black Cherry Pouch Gall in that the aperture is not funnel-shaped. Choke Cherry Pouch Gall. Prunus virginiana. T. D. J., Guelph.

Eriophyes sp. A very long, slender, pouch-gall, green or whitish on either side of the leaf. Wild Plum Pouch Gall. Prunus americana. T. D. J., Guelph.

Eriophyes phlœocoptes. A tubular growth, encircling base of buds and shoots. Plum Bud Gall. Prunus domestica. T. D. J., Guelph.

Host—Genus Pyrus.

Apple, Crab Apple. Pear and Chokecherry.

Eriophyes sp. Dimple galls, with the concavity on the upper surface of the leaf. Internal surface corrugated. Apple Dimple Gall. Pyrus malus. T. D. J., Guelph.

Eriophyes pyri. Capsule Galls on the upper side of the leaf. Apple and Pear "Leaf-blister" Gall. Pyrus malus, P. coronaria and P. communis. T. D. J., Guelph.

Eriophyes sp. Capsule Galls, very small. When mature, brown in color. Chokecherry Speck Gall. Pyrus arbutifolia. T. D. J., Guelph.

Host—Sumac.

Eriophyes sp. The leaf margin rolled tightly upward and inward on both sides. Sumac Leaf-margin Gall. Rhus typhina. T. D. J., Guelph.

Eriophyes sp. Irregular, rounded, dimple gall, convex on the upper or under side of the leaf. Green to red or purple in color; inside clothed with white trichomes. Poison Ivy Dimple Gall. Rhus radicans. T. D. J., Guelph.

Host—Willow.

Eriophyes sp. A pale green or purple capsule gall, projecting either above or below the leaf, or both; 1½ to 2 mm. in diameter. Salix cordata. T. D. J., Guelph.

Eriophyes sp. Small, irregular, serrate and roughened pocket-galls or semi-capsules, green or red, strongly pilose above and thickly pubescent beneath. Usually on the upper side of the leaf. Salix discolor. T. D. J., Guelph.

Eriophyes sp. Small, crimson pocket-galls or semi-capsules on the upper side of the leaf. 1½ to 2½ mm. in diameter. Salix amygdaloides. T. D. J., Guelph.

Eriophyes sp. A small capsule gall, irregularly hemispherical, greenish yellow, with a projecting aperture usually on the lower surface of the leaf, 1 to 2½ mm. in diameter. Salix nigra. T. D. J., Guelph.

Eriophyes sp. Small, irregular, serrate capsule gall, green or red, usually on the upper side of the leaf; beneath sometimes impressed, more often projecting. 1 to 2 mm. in diameter. Salix bebbiana. T. D. J., Guelph

Eriophyes sp. Small, irregular, serrate capsule gall, projecting on both sides of the leaf, 1 to 2 mm. in diameter. Salix petiolaris. T. D. J., Guelph.

Eriophyes sp. A bud deformation of the flower catkins and leaf buds or parts of leaves, producing a large, irregular, crumpled mass. Salix nigra. T. D. J., Guelph.

Eriophyes sp. Rosette-like structures on the leaves and stems. Unsightly Willow Gall. Salix sp. T. D. J., Guelph.

Family Demodecidæ.

This again is a small family, only two species being found in the Province, one parasitic upon man and the other on swine. They are small and worm-like and resemble the gall mites.

Demodex folliculorum, Simon. Parasitic on man. T. D. J., Guelph.
Demodex phylloides, Croker. On hog. T. D. J., Guelph.

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Fletcher, James. The Locust Mite. Report of Entomologist and Botanist, Central Experimental Farm, Ottawa, p. 240, 1896.

Jarvis, Tennyson D. The Phlox Mite, Tetranychus bimaculatus. Thirty-sixth Annual Report of the Entomological Society of Ontario, 1905. Mites affecting Farm Homesteads. The Canadian Entomologist, Vol. XXXVIII., No. 7, 1906. The Locust Mite. The Canadian Entomologist, Vol. XXXVIII., No. 10, 1906. Apparatus for trapping small Arthropods. Thirty-ninth Annual Report of the Entomological Society of Ontario, 1908. Gall Insects of Ontario. Thirty-seventh, thirty-eight and thirty-ninth Annual Reports of the Entomological Society of Ontario.

Saunders, William. Destroying eggs of Clisiocampa sylvatica and C. Americana on Nursery Stock in Ontario. Ninth Annual Report of the Entomological Society of Ontario.

THE ENTOMOLOGICAL RECORD, 1909.

By Arthur Gibson, Ottawa.

The weather conditions of 1909, on the whole, in Canada, were particularly well suited for the growth of vegetation of all kinds. In eastern Ontario, comparatively speaking, there were few really hot days, and these not until about the middle of August. Injurious insects were not complained of to such an extent as they were in 1908. Many collectors have commented on the scarcity of insects, even of many of the commoner forms. As is always the case, however, desirable species have been collected by those who have worked assiduously throughout the season. In Manitoba, Mr. Norman Criddle reported that the season was a most peculiar one, the evenings being particularly bright, for which reason it was almost impossible to attract any moths to lights. In the early part of the season, too, there was an exceptional outbreak of plant lice of all kinds, and it was noticed that night-flying moths frequented trees, mostly Manitoba maples and oaks, which were infested by the aphides, to feed upon their honey dew. The past season was certainly a most remarkable one for plant lice all over Canada.

During 1909 a good deal of material, collected in previous years, has been worked up by specialists, and notes on some of these are included in this year's Record. Unfortunately, a number of our Canadian collectors have not been as active in 1909 as they were in other years. Undoubtedly the great loss sustained by entomologists generally throughout Canada in the death of Dr. James Fletcher, has had some effect on systematic work. We should, however, now even strive all the more to continue the work he so ardently encouraged.

Since the appearance of the Entomological Record for 1908, the writer has received letters from many collectors, all of whom expressed the hope that the Record would be continued from year to year. He begs to thank his correspondents for their continued interest and help.

During 1909 few important expeditions have been made in Canada, as far as the writer knows, for the purpose of collecting and studying insects. Mr. J. B. Wallis, of Winnipeg, Man., spent most of the summer in the Okanagan Valley of British Columbia, and while there collected several thousand specimens which will be gradually worked up. Mr. C. H. Young, of the Geological Survey, Ottawa, while at Ucluelet, B.C., from May to August, collected a good many insects of interest. His work there, however, with Prof. John Macoun, of the same institution, was chiefly connected with the collection and preservation of star fish, crabs and other salt water objects. Mr. Geo. A. Moore, of Montreal, collected hemiptera almost exclusively at North Hatley, Que., in July, and secured much interesting material. The writer spent the whole of August in New Brunswick and Prince Edward Island and brought back collections in all orders.

In 1907 Messrs. Ernest Thompson Seton and E. A. Preble brought back with them from the Great Slave region a small collection of lepidoptera, among which were some interesting species. Mr. Wm. Beutenmuller, of the American Museum of Natural History, New York, has very kindly sent me a list of the species, and mention is made of several of them in this Record.

As in previous years, Canadian students have again to acknowledge the great help which they have received during the year from specialists in the United States and elsewhere. Those who have specially helped, in 1909, are: Dr. L. O. Howard, with his assistants, at Washington, D.C.; Dr. J. B. Smith, of New Brunswick, N.J.; Sir George Hampson, of the British Museum; Prof. H. F.

Wickham, of Iowa City, Iowa; Mr. W. D. Kearfott, of Montclair, N.J.; Mr. E. P. Van Duzee, of Buffalo, N.Y.; Mr. Wm. Beutenmuller, of New York, N.Y.; Dr. Henry Skinner, of Philadelphia, Pa.; Dr. E. M. Walker, of Toronto, Ont.; Col. Thos. L. Casey, of Washington, D.C.; Mr. Charles Leibeck, of Philadelphia, Pa., and Rev. G. W. Taylor, of Departure Bay, B.C.

Literature.

Among the publications which have been received during the year, and which are of interest to Canadian students, mention may be made of the following:—

Back, Ernest A. The Robber-flies of America, North of Mexico, belonging to the subfamilies, Leptogastrinæ and Dasypogoninæ. Trans. Amer. Ent. Soc., Numbers 2 and 3, April-September, 1909, pp. 137-400. In this splendid paper 194 species, and 36 genera are described; 20 species and 1 genus are new. Eleven plates, illustrating a number of the species, appear at the end of the paper. Only 12 species are recorded from Canada. Many others have doubtless been taken in the Dominion, but these were not available for study by the author. The paper is a welcome one and will be of much value to dipterists.

Banks, Nathan. Directions for Collecting and Preserving Insects. Washington; Smithsonian Institution, Bulletin No. 67. This valuable bulletin was received on Oct. 14, 1909. It takes the place of the work prepared in 1892, under the direction of the late Dr. C. V. Riley. Many new features occur in this bulletin, and a large number of notes are included which have been furnished by specialists in the different Orders. 188 figures in the text appear, as against 139 in Riley's publication. The Bulletin will be most useful as a means of reference.

Beutenmuller, William. The Species of Holcaspis and their Galls (issued 17th Feb., 1909); The Species of Amphibolips and their Galls, (issued March 9, 1909); The North American Species of Diastrophus and their Galls, (issued March 19, 1909): American Museum of Natural History, New York. These papers on gall insects are most useful. The illustrations accompanying each are beautifully drawn, and with the descriptions of the galls and the makers, afford an easy means of identification. We hope to see more of these articles by this well-known author. Many of the species included in the above papers occur in Canada.

Blaisdell, Frank E., Sr. A Monographic Revision of the Coleoptera belonging to the Tenebrionid Tribe Eleodiini, inhabiting the United States, Lower California and adjacent Islands. United States National Museum, Bulletin 63, Washington, issued June 24, 1909. This important monograph of 524 pp. and 13 plates, represents an enormous amount of work for which coleopterists generally will be very grateful. 124 species and varieties are treated of, each at considerable length. It is to be hoped that this bulletin will be freely used by Canadian coleopterists, so that we may soon know more about the beetles of this tribe occurring in the Dominion.

Hampson, Sir George F. (*Bart*). Catalogue of the Lepidoptera Phalænæ in the British Museum; Vol. VII., pp. 709, plates cviii. to cxxii., received Feb. 8th, 1909; Vol. VIII., pp. 583, plates cxxiii. to cxxxvi., received Sept. 1st, 1909. These two volumes which appeared during the year are of great interest to students of the lepidoptera. Vol. VII. is the first part of "the classification of the very large sub-family *Acronyctinæ*, which comprises some 3,000 species belonging to over 300 genera. ..... The sub-family is characterised by the trifid neuration of the hind wing combined with spineless tibiæ and smooth eyes not surrounded by bristle-like hair, and it is the least specialised of the sub-

families of the *Noctuidæ Trifinæ*." Vol. VIII. is the second part of the *Acronyctinæ;* 104 genera are treated of, comprising 720 species. In Vol. VII., 843 species belonging to 96 genera are dealt with. The third and final part of the subfamily is prepared and it is expected will be issued very soon. The beautiful coloured plates which accompany each volume of the Catalogue, are of immense service to students. Those which refer to Vols. VII. and VIII., are of the same degree of excellence. Many of the species figured occur in Canada, and are at once recognized. We are glad to see the names of several Canadian collectors in the text, all of whom have sent material for the collection of the British Museum. Sir George Hampson is very grateful for noctuids from Canada, and all who can should assist him as far as possible in his valuable work.

Hopkins, A. D. The Genus Dendroctonus. (Contributions toward a monograph of the Scolytid beetles). United States Department of Agriculture, Bureau of Entomology; Technical Series No. 17, Part 1, issued June 30, 1909. The results of Dr. Hopkins' studies in this important genus will be of much use to coleopterists generally, and of particular interest to the economic entomologist. This first part of the bulletin is one of the best of the many valuable publications of the U. S. Bureau of Entomology. In the introductory chapter it is stated that, "It is the purpose of this paper to revise and bring up to date the available information on the described species, to describe those that appear to be new to science, and to record the results of original investigations relating to the more technical details that can not well be included in the paper which is to follow as a part of a bulletin in the regular series and which will give full information on the bionomic features." Twenty-four species are treated of, seven of which are new to science.

Smith, John B. Our Insect Friends and Enemies—The Relation of Insects to man, to other animals, to one another, and to plants, with a chapter on the War Against Insects. Philadelphia and London, J. B. Lippincott Company, 1909. This splendid work of 314 pp., by the above recognized authority, is a very welcome addition to the literature of Entomology. Dr. Smith has divided the book into 12 chapters, viz.: (I) Insects in their Relation to the Animal Kingdom; (II.) Insects in their Relation to Plants as Benefactors; (III.) Insects in their Relation to Plants as Destroyers; (IV.) Insects in their Relation to each other; (V.) Insects in Relation to the Animals that feed on them; (VI.) Insects in their Relation to Weather and Diseases that affect them; (VII.) Insects in their Relation to other Animals; (VIII.) Insects in their Relation to Man as Benefactors; (IX.) Insects in their Relation to Man as Carriers of Diseases; (X.) Insects in their Relation to the Household; (XI.) Insects in their Relation to the Farmer and Fruit Grower; (XII.) The War on Insects.

The book is full of information and will doubtless have a very wide sale. It is illustrated by many figures in the text, and at the beginning there is a full-paged coloured plate of some of the commoner insects which are troublesome in houses. The work is well printed, and we congratulate the author on this latest of his many publications.

Snodgrass, R. E. The Thorax of Insects and the Articulation of the Wings: Proc. U. S. Nat. Museum, Vol. XXXVI., pp. 511-595; separates published June 18, 1909. This paper will be found of much interest to entomologists generally. It represents a good deal of careful work and will no doubt be of much use to students. The author states that the paper is an attempt to show the unity of thoracic structure that prevails throughout all the orders of insects. Thirty plates appear at the end of the paper and there are, besides, some figures in the text.

SWAINE, J. M. Catalogue of the Described Scolytidæ of America, North of Mexico. Appendix B., 24th Report of the State Entomologist on Injurious and other Insects of the State of New York, 1908, received Sept. 30, 1909. This catalogue covering 84 pages practically includes, the author states, all the literature published on the North American species of the family. 191 species are listed. It will be of much value to entomologists, especially those engaged in economic work. The author is to be congratulated on the result of his labour, and students generally will be grateful to Dr. Felt for publishing the catalogue.

The following is a list of the names and addresses of collectors heard from during 1909:—

Anderson, E. M., Provincial Museum, Victoria, B.C.
Baird, Thomas, High River, Alta.
Baldwin, J. W., 74 Besserer Street, Ottawa.
Bethune, Rev. Prof., O. A. C., Guelph.
Boulton, A. R. M., care King Brothers, Quebec, Que.
Bush, A. H., 1105 Ninth Ave., Vancouver, B.C.
Chagnon, Gus., Box 186, Montreal.
Cockle, J. W., Kalso, B.C.
Criddle, Norman, Treesbank, Man.
Dawson, Horace, Hymers, Ont.
Day, G. O., Duncans, B.C.
Dent, W. A., Sarnia, Ont.
Dod, F. H., Wolley, Millarville, Alta.
Evans, J. D., Trenton, Ont.
Fyles, Rev. T. W., Hull, Que.
Gibson, Arthur, Experimental Farm, Ottawa.
Groh, H., Experimental Farm, Ottawa.
Hahn, Paul, 433 Indian Road, Toronto.
Halkett, A., Fisheries Museum, Ottawa.
Hanham, A. W., Duncans, B.C.
Harms, J. F., Treesbank, Man.
Harrington, W. H., P.O. Department, Ottawa.
Harvey, R. V., Victoria, B.C.
Heath, E. F., Cartwright, Man.
Hudson, A. F., Millarville, Alta.
Jarvis, T. D., O. A. C., Guelph.
Keele, Jos., Geological Survey, Ottawa.
Keen, Rev. J. H., Metlakatla, B.C.
Letourneau, Jos. A., Experimental Farm, Ottawa
Lyman, H. H., 74 McTavish Street, Montreal.
Marmont, L. E., 2553 Second Ave. West, Vancouver, B.C.
McIntosh, W., St. John, N.B.
Metcalfe, W., 288 Bank Street, Ottawa.
Moore, W. H., Scotch Lake, N.B.
Moore, G. A., 850 St. Hubert Street, Montreal.
Morris, Frank, Port Hope, Ont.
Nelles, Douglas H., Dept. Interior, Ottawa.
Perrin, Jos., McNab's Island, Halifax, N.S.
Rowland, Alton, Windsor Mills, Que.

Russell, John, Bon Accord, New Westminster, B.C.
Sanson, N. B., Banff, Alta.
Saunders, Henry, 21 Harbord Street, Toronto.
Sherman, R. S., 2285 Sixth Avenue, Vancouver, B.C.
Simpson, W., Dominion Observatory, Ottawa.
Southee, G. R., Sherbrooke, Que.
Swaine, J. M., Macdonald College, Que.
Taylor, Rev. G. W., Departure Bay, B.C.
Tipping, E. Dalton, Bluff Centre, Alta.
Venables, E. P., Vernon, B.C.
Walker, Dr. E. M., Harbord St., Toronto.
Wallis, J. B., Machray School, Winnipeg, Man.
Willing, T. N., Regina, Sask.
Wilmot, E. S., Vernon, B.C.
Wilson, W. J., Geological Survey, Ottawa.
Winn, A. F., 32 Springfield Ave., Westmount, Que.
Young, C. H., Geological Survey, Ottawa.
Zavitz, E. J., O. A. C., Quelph, Ont.

NOTES OF CAPTURES.

Lepidoptera.

(Arranged according to Dyar's List of North American Lepidoptera, U.S. N.M. Bull. No. 52).
(Dyar's number).

5. *Iphidicles ajax* L. Pt. Pelee, Ont., 1 specimen, Sept. 6, (P. T. Taverner). On August 18, 1904, Dr. W. W. Newcomb, of Detroit, Mich., found this butterfly common at a patch of Papaw near Windsor, Ont. 15 eggs, 64 larvæ and chrysalids were found and 7 imagoes seen.
34. *Pintia* sisymbri Bdv. Fort Smith, Mackenzie, June 15, (Thompson and Preble).
63. *Eurymus hecla* Lefbr. On Island, north shore of Great Slave Lake, July 23, Long. 110°, (Thompson and Preble).
73. *Eurymus pelidne* Bdv. East end of Clinton-Golden Lake, Aug. 10; Artillery Lake, Aug. 13, (Thompson and Preble).
104. *Argynnis cornelia* Edw. Golden, B.C., June 24, (Wallis).
139. *Brenthis polaris* Bdv. On Island, near north shore of Great Slave Lake, July 23, (Thompson and Preble).
248. *Chlorippe clyton.* B. & LeC. Pt. Pelee, Ont., common, Aug. 14, 6 specimens taken, (P. A. Taverner).
289. *Œneis macounii* Edw. On Island, north shore of Great Slave Lake, July 23, (Thompson and Preble). A new locality for this interesting butterfly.
290. *Œneis nevadensis* Felder. Vernon, B.C., one specimen in the valley; the first I have seen, (Venables).
295f. *Œneis taygete* Hbn. East end of Clinton-Golden Lake, Aug. 10; on Island, north shore of Great Slave Lake, July 23, (Thompson and Preble).
362. *Mitoura damon* Cramer. Pt. Pelee, Ont., May 31, (Dr. W. W. Newcomb). Writing of this species, Dr. Newcomb says: "In walking along and dis-

turbing low vegetation, mostly *Juniperus communis,* I discovered this handsome little butterfly. In about an hour in the middle of the day I secured 12 specimens, and my friend, Taverner, also caught several. One male was very dark above with just a suggestion of the brownish-yellow scales on the disk of the four wings and a trace of the same above and between the tails. I should class this as Brehme's *patersonia,* or at least as coming very close to it."

469. *Pamphila palæmon* Pallas. Sherbrooke, Que., July 1, (Southee).

644. *Hesperia centaureæ* Ramb. Fort Smith, Mackenzie, July 2, (Thompson and Preble).

683. *Ampelophaga versicolor* Harris. Britannia, near Ottawa, July 26, (Baldwin).

699. *Phlegethontius convolvuli* L., a *cingulata* Fab. Trenton, Ont. (Evans).

702. *Sphinx perelegans* Hy. Edw. Wellington, B.C., June 6, 7, (Taylor); Peachland, July 6, (Wallis).

704. *Sphinx luscitiosa* Clemens. Britannia, near Ottawa, July 9, 22; 2 specimens, (Baldwin).

728. *Marumba modesta* Harr. Artillery Lake, Aug. 13. (Thompson and Preble). A very northern record.

778. *Basilona imperialis* Dru. Go-Home-Bay, Ont., one specimen found in water, July 12, (Williams); Trenton, Ont., 1 sp. June 27, (Evans).

869. *Neoarctia yarrowi* Stretch. One female at rest on a rock in the hot sun on Mt. Huber, B.C., Aug. 9, about 8,000 feet above sea level, (Lyman).

960. *Panthea acronyctoides* Walk. Montmorency Falls, Que., June 23, (Lyman).

981. *Apatela cretata* Smith. Millarville, Alta., June 22 to July 16th, about 20 specimens at treacle, (Dod).

1,008. *Apatela funeralis* Grt. McNab's Island, Halifax, N.S., emerged June 20, (Perrin).

1,029. *Apatela sperata* Grt. Regina, Sask., June 15, (Willing).

1,042. *Apatela lanceolaria* Grt. Larva found on cherry at Saskatoon, Sask.; green with yellowish bristles from tubercles, one and three-quarter inches long; fed it on some rose leaves; pupated Aug. 1, moth emerged April 28, (Willing).

1,050. *Merolonche lupini* Grt. Duncans, B.C., one at light, (Hanham).

1,053. *Harrisimemna trisignata* Walk. Windsor Mills, Que. (Rowland); Hull, Que., full grown larva on ash, Aug. 28, (Groh).

1,075. *Baileya doubledayi* Gn. Windsor Mills, Que., (Rowland).

1,141. *Oligia grata* Hbn. Trenton, Ont., Oct. 18, (Evans).

1,147. *Hillia discinigra* Walk. Cartwright, Man., Aug. 24, (Heath).

1,211. *Hadena stipata* Morr. McNab's Island, Halifax, N.S., Sept. 13, (Perrin).

1,220. *Hadena vultuosa* Grt. Millarville, Alta., June 28, (Dod).

1,223. *Hadena morna* Strk. High River, Alta., (Baird).

Hadena commoda Walk, = *alberta* Smith. Millarville, Alta., June 22 to July 24, about 20 specimens at treacle. I have seen the type of *commoda* in the British Museum, and agree with Sir George Hampson in referring Prof. Smith's species here, (Dod).

1281. *Hyppa brunneicrista* Sm. Millarville, Alta., June 21 to 30, about 20 specimens at treacle, being more than I had ever seen altogether; mostly worn; I saw fewer *xylinoides,* (Dod).

1,286. *Momophana comstocki* Grt. McNab's Island, Halifax, N.S., June 11, (Perrin).

Oncocnemis poliochroa Hamp. Penticton, B.C., Aug. 10; Peachland, B.C., Aug. 7, (Wallis). A record for B.C., (Dod).

1,401. *Rhynchagrotis vittifrons* Grt. Penticton, B.C. (L. A. De Wolfe).

1,409. *Rhynchagrotis crenulata* Sm. Penticton, B.C. (L. A. De Wolfe).

1,413. *Adelphagrotis indeterminata* Walk. Duncans, B.C., August, at sugar, rare, (Hanham).

1,480. *Noctua conchis* Grt. Regina, Sask., July 11, (Willing).

Noctua patefacta Sm. Millarville, Alta., July 8 to Aug. 9, a few at treacle. The type of *juncta* Grt., which Sir George Hampson treats as distinct, came from Nova Scotia, and has a pale head and thorax, with dark, pale tipped collar. *Patefacta* has these parts dark, and nearly unicolorous. The variation, however, is towards *juncta,* and I doubt their distinctness, (Dod).

1,507. *Noctua flavotincta* Sm. Ucluelet, B.C., (Young).

1,514. *Noctua lubricans* Gn. Mt. St. Hilaire, Que., June 30, (Chagnon).

Noctua dislocata Sm. Millarville, Alta., July 10 to 24, a few at treacle, (Dod).

1,530. *Rhizagrotis albicosta* Sm. The specimen recorded from High River, in 1906, is the red costal form of *flavicollis* Sm., recorded in the next line from the same place. Specimens named *albicosta,* by Prof. Smith, in the British Museum, are an entirely dissimilar species, which I have not yet seen from Canada, (Dod).

1,682. *Paragrotis fuscigera* Grt. The specimen so recorded in the Record for 1908, from Olds, Alta., is the species listed as *pleuritica,* from Calgary. Both names are wrong for the species, which Sir George Hampson will shortly describe as new, (Dod).

1,724. *Paragrotis obeliscoides* Gn. Trenton, Ont., 2 sp., July 5, 1 sp. July 10, (Evans).

Mamestra artesta Sm. Winnipeg, Man., June 26, (Wallis).

1,782. *Mamestra lustralis* Grt. Sudbury, Ont., (Evans).

1,789. *Mamestra capsularis* Gn. Aweme, Man., June 18, 28, two specimens, (Criddle).

1,806. *Mamestra rubefacta* Morr. Millarville, Alta., one at treacle, June 25, (Dod).

1,827. *Mamestra obscura* Sm. Trenton, Ont., June 2, (Evans).

1,874. *Mamestra tacoma* Strk. Ottawa, June 6, (Gibson); Trenton, Ont., (Evans).

1,877. *Mamestra circumvadis* Sm. Millarville, Alta., one male at light, July 10 (Dod).

1,951. *Nephelodes pectinatus* Sm. Millarville, Alta., Aug. 17, at light, (Dod).

1,983. *Leucania calgariana* Sm. Millarville, Alta., a few at treacle, July 5 to 20, (Dod).

2,012. *Graphiphora culea* Gn. Trenton, June 14, (Evans).

2,072. *Aporophila yosemitae* Grt. Hymers, Ont., Sept. 12, (Dawson).

2,111. *Xylina thaxteri* Grt. Hymers, Ont., Sept. 2, (Dawson); McNab's Island, Halifax, N.S., June 12, (Perrin).

Cucullia indicta Sm. Millarville, Alta., one male, at Burgamot, Aug. 1, rare; this will probably prove to be synonymous with *obscurior* of Smith, (Dod).

Gortyna pallescens Sm. Millarville, Alta., one about Sept. 8, disturbed from a bunch of hay, a frequent method of capture in some previous years. My note in the Record for 1906 should have referred to this species and not *medialis* Sm., of which I have seen typical specimens from Colorado which look distinct, (Dod).

Gortyna thalictri Lyman. Aweme, Man., Oct. 1, (Criddle); a poor speciman of what I think is this species was taken this year at Winnipeg by Mr. Wallis. The variety *perobsoleta,* Lyman, was collected the past season at Hymers, Ont., by Mr. Dawson.

Gortyna nepheleptena Dyar. Ottawa, Sept. 23, (Fletcher); Oct. 17, (Gibson). The first Canadian records.

2,200. *Xanthia pulchella* Sm. Duncans, B.C., Sept., over 20 specimens taken at sugar. During previous residence of six years on Vancouver Island, had only taken two specimens, (Hanham).

2,214. *Tapinostola variana* Morr. Britannia, near Ottawa, July 28, (Baldwin); Trenton, Ont., another specimen taken July 31, (Evans).

2,221. *Orthosia ralla* G. & R. Trenton, Ont., Aug. 20, (Evans).

2,301. *Heliothis phlogophagus* G. & R. Winnipeg, Man., Oct. 2, (Wallis).

Polychrysia trabea Sm. Millarville, Alta., July 23 to Aug. 9, about thirty specimens, principally at flowers of Larkspur, on which the larva in all probability feeds. I have clusters of these flowers in my garden, but those growing wild attracted by far the greater number. These captures are an interesting discovery, as the food plant of *moneta* in Europe is Monkshood, which belongs to the same family. The only constant difference between the European and North American forms appears to be that the latter is slightly paler in colour. I have not seen typical Siberian *esmeralda,* (Dod).

2,481. *Eosphoropteryx thyatiroides* Gn. Duncans, B.C., a single specimen at bloom in my garden in 1908 and another in 1909; a rare visitant on Vancouver Island, (Hanham).

2,494. *Autographa rubidus* Ottol. Millarville, Alta., June 23 to July 5, six specimens, five of them at treacle. It is unusual for this genus to come to treacle in this district, and the capture of five specimens by this means suggests that I might have found the species common had I discovered its favourite flower, as I did *trabea,* (Dod).

2,528. *Autographa sackeni* Grt. Millarville, Alta., one worn specimen flying in sunshine, Aug. 1, (Dod).

2,529. *Autographa snowi* Hy. Edw. "Head of Pine Creek, Calgary" (the locality usually cited in this Record, with equal correctness, as "Millarville"), July 23, 1905, (Dod), and Mt. Athabasca, Alberta Rockies, July 31, 1907, (Mrs. Nicholl). Both specimens are in the British Museum and agree fully with the description and with Ottolengui's figure. So far as I know these are the first correct records from Canada. The resemblance to *sackeni* is very close, (Dod).

Syngrapha microgramma Hbn. Millarville, Alta., July 1 to 12, 1903 and 1904. This is the species erroneously recorded by me as *snowi* in Can. Ent., xxxvii, 45. I took a specimen to the British Museum and found that it fully agreed with European specimens, so that the name must now be added to our lists, (Dod).

2,540. *Ogdoconta cinereola* Gn. Cartwright, Man., 1 sp. Sept. 24, very rare here, (Heath); Winnipeg, Man., Sept. 20, (Wallis).

2,682. *Tarache cretata* G. & R. Trenton, Ont., June 14, 25, (Evans).

2,724. *Phalaenostola larentioides* Grt. Trenton, Ont., July 3, (Evans).

2,728. *Hyamia perditalis* Walk. Trenton, Ont., 2 sp. July 2, Aug. 3, (Evans).

2,769. *Meliopotis limbolaris* Geyer. McNab's Island, Halifax, July 16, (Perrin).

2,777. *Cirrhobolina deducta* Morr. Millarville Alta., one worn female at treacle, July 5; new to Alberta, and, I believe, a great rarity in Canada, (Dod).

2,825. *Catocala elda* Behr. Duncans, B.C., (Hanham).

2,836. *Catocala luciana* Hy. Edw. Cartwright, Man., Aug. 22, very rare, (Heath).

2,868. *Catocala piatrix* Grt. Pt. Pelee, Ont., Aug. 14, (P. A. Taverner).

2,990. *Homoptera minerea* Gn. Trenton, Ont., June 7, (Evans).

Pheocyma largera Sm. Penticton, B.C., (L. A. De Wolfe).

3,006. *Erebus odora* L. Pt. Pelee, Ont., Sept. 8, (P. A. Taverner); Quebec, Que., July 28, (Fyles); Brandon, Man., record sent by Mr. Willing.

3,038. *Philometra hanhami* Sm. Trenton, Ont., July 11, 29, (Evans). This is only the second time this species has been taken in the East.

3,136. *Heterocampa umbrata* Walk. Winnipeg, June 24, (Wallis).

3,159. *Cerura scitiscripta* Walk., a. *multiscripta* Riley. Winnipeg, June 22, (Wallis); Aweme, Man., (Criddle).

3,193. *Olene achatina* S. & A. Trenton, Ont., July 19, (Evans).

3,238. *Opheroptera boreata* Hbn. Trenton, Ont., Oct. 28, 29, two specimens, (Evans).

3,240. *Rachela bruceata* Hulst. Kaslo, B.C., (Cockle). New to British Columbia, (G. W. T.).

Rachela pulchraria Taylor. Kaslo, B.C., (Cockle).

3,272. *Eupithecia luteata* Pack. Trenton, Ont., 2 sp., July 22, Aug. 6, (Evans).

3,282. *Eupithecia albicapitata* Pack. One specimen labelled "E. Ontario," (Evans).

Eupithecia packardata Taylor. Trenton, Ont., Aug. 16, (Evans).

Eupithecia placidata Taylor. Kaslo, B.C., (Cockle).

Eupithecia agnesata Taylor. Kaslo, B.C., (Cockle).

Eupithecia terminata Taylor. Kaslo, B.C., (Cockle).

Eupithecia slocanata Taylor. Kaslo, B.C., (Cockle).

Eupithecia minorata Taylor. Kaslo, B.C., (Cockle).

Eupithecia adornata Taylor. Kaslo, B.C., (Cockle).

Eupithecia hanhami Taylor. Ucluelet, B.C., (Young).

Eupithecia harveyata Taylor. Ucluelet, B.C., (Young).

Eupithecia casloata Dyar. Ucluelet, B.C., (Young).

Eupithecia compactata Taylor, MS. Ucluelet, B.C., (Young).

Eupithecia albipunctata Haw. Ucluelet, B.C., (Young). This species is recorded in *Canadian Entomologist,* Dec., 1909, p. 428. I had not seen it from Vancouver Island before, (G. W. T.).

Eucymatoge togata Hbn. Departure Bay, B.C., (Taylor).

3,328. *Eucymatoge vitalbata* D. & S. Kaslo, B.C., (Cockle). New to British Columbia, (G. W. T.).
Eutephria lagganata Taylor. Laggan, B.C., (Dod).
Eutephria takirata Taylor. Takir R., B.C., (T. Bryant).
Aplodes unilinearia Taylor. Kaslo, B.C., (Cockle); Victoria, B.C., (Harvey).
Sciagraphia purcellata Taylor. Kaslo, B.C., (Cockle).
3,706. *Cymatophora bitactata* Walk. Kaslo, B.C., (Cockle). New to British Columbia, (G. W. T.).
3,734. *Cymatophora denticulodes* Hulst. Kaslo, B.C., (Cockle); Similkameen, B.C., (Harvey).
3,767. *Caripeta aequaliaria* Grt. Departure Bay, B.C., (Taylor).
3,835. *Selidosema separataria* Grt. Kaslo, B.C., (Cockle). New to British Columbia, (G. W. T.).
3,922. *Ennomos subsignarius* Hbn. Another visitation of these moths appeared at Ottawa on Aug. 5 and 6. Although great swarms were seen, the numbers did not seem so large as last year, (Groh). Mr. Winn, also, reports that the moths were abundant at Montreal, at intervals, in August.
4,040. *Leucobrephos brephoides* Walk. Winnipeg, Man., April 17, (Wallis).
4,043. *Callizzia amorata* Pack. Trenton, Ont., 2 sp., June 18, Aug. 1, (Evans).
4,274. *Lipocosma fuliginosalis* Fern. Trenton, Ont., 6 sp., July 2, 5, 11, 18, 29, (Evans).
Blepharomastix nymphulalis Haimback. St. Johns, Que., July 24, (Chagnon).
4,400. *Perispasta caeculalis* Zell. Trenton, Ont., 2 sp., June 14, 25, (Evans).
4,484. *Lineodes integra* Zell. Trenton, Ont., Sept. 13, (Evans).
Paralipsa terrenella Zell. Trenton, Ont., June 24, (Evans).
4,514. *Pyralis cuprina* Zell. Trenton, Ont., July 11, (Evans).
4,519. *Pyralis cohortalis* Grt. Trenton, Ont., June 27, July 29, (Evans).
4,546. *Schoenobius clemensellus* Rob. Trenton, Ont., July 1-29, (Evans).
4,560. *Crambus hamellus* Thunb. Kamouraska, Que., Aug. 19, (Winn).
4,566. *Crambus unistriatellus* Pack. Trenton, Ont., 2 sp., July 9, 26, (Evans).
4,574. *Crambus alboclavellus* Zell. Trenton, Ont., July 2-25, (Evans).
4,587. *Crambus ruricolellus* Zell. Trenton, Ont., 1 sp., July 3, (Evans).
Thaumatopsis gibsonella Kearf. Trenton, Ont., 1 sp., Sept. 5, (Evans). Second Ontario record.
4,599. *Crambus oregonicus* Grt. Departure Bay, B.C., (Young).
4,622. *Argyria auratella* Clem. Trenton, Ont., 3 sp. July 6, 9, (Evans).
4,632. *Chilo forbesellus* Fern. Trenton, Ont., 4 sp. July 11, 14, 27, 29, (Evans).
4,633. *Chalcoela aurifera* Zell. Trenton, Ont., 1 sp. July 22, (Evans).
4,698. *Mineola tricolorella* Grt. Trenton, Ont., 2 sp., July 2, 11, (Evans).
4,734. *Nephopteryx ovalis* Pack. Trenton, Ont., July 2-17, (Evans).
4,748. *Meroptera unicolorella* Hulst. Trenton, Ont., June 18, July 11, Aug. 17, (Evans).
4,835. *Euzophera ochrifrontella* Zell. Trenton, Ont., July 9, (Evans).
4,871. *Homœosoma mucidellum* Rag. Trenton, Ont., June 13, 20, July 25, Aug. 2, 23, (Evans).
4,886. *Moodna ostrinella* Clem. Trenton, Ont., June 17, (Evans).
4,888. *Moodna pelviculella* Hulst. Trenton, Ont., July 24-30, Aug. 14, (Evans).

4,973. *Pterophorus paleaceus* Zell. Trenton, Ont., 2 sp., June 20, 21, (Evans).

5,033. *Olethreutes capreana* Hbn. Trenton, Ont., 1 sp., July 2, (Evans).

5,057. *Olethreutes constellatana* Zell. Trenton, Ont., 2 sp., June 18, 22, (Evans).

Olethreutes removana Kearf. Trenton, Ont., 2 sp., July 3, 4, (Evans).

5,121. *Eucosma juncticiliana* Wlsm. Trenton, Ont., 3 sp., July 17, 23, Aug. 1, (Evans).

5,134. *Eucosma trigeminana* Steph. Trenton, Ont., 1 sp., June 20, (Evans).

5,140-1. *Eucosma obfuscana* Riley. Isle of Montreal, Que., June 13, (Chagnon). Closely allied to *E. scudderiana* Clem., and, like this species, the larvæ will be found making galls in the stems of aster, or goldenrod, (W. D. K.).

Eucosma landana Kearf. Redvers, Sask., (A. J. Crocker).

5,142. *Eucosma otiosana* Clem. Trenton, Ont., 7 sp., June 25, Aug. 30, (Evans).

5,167. *Thiodia aspidiscana* Hbn. Trenton, Ont., 5 sp., June 7, 13, 14, 22, (Evans).

Thiodia essexana Kearf. Trenton, Ont., 1 sp., June 12, (Evans).

Epinotia plumbolincana Kearf. Departure Bay, B.C., (Young).

5,248. *Ancylis burgessiana* Zell. Trenton, Ont., 2 sp., June 18, Aug. 6, (Evans).

5,253. *Ancylis angulifasciana* Zell. Trenton, Ont., 1 sp., July 11, (Evans).

Enarmonia vancouverana Kearf. Redvers, Sask., (A. J. Crocker).

5,295. *Melissopus latiferreanus* Walsm. Mt. St. Hilaire, Que., June 25, (Chagnon). The larvæ may be found during the winter in fallen acorns, usually in company with a Buprestid larva, also an Holocera larva. Sometimes all three may be found in the same acorn, (W. D. K.).

5,353. *Sparganothis flavibasana* Fern. Ottawa, larvæ again abundant on a few cultivated Loniceras, mature June 15, (Gibson).

5,387. *Platynota sentana* Clem. Trenton, Ont., 1 sp., June 27, (Evans).

5,396. *Tortrix pallorana* Rob. Trenton, Ont., 2 sp., Aug. 29, Sept. 5, (Evans).

5,406. *Tortrix fumiferana* Clem. Ottawa, thousands of the moths flying around trees and shrubs in the district, July 20, (Gibson).

5,435. *Phalonia smeathmanniana* Fab. Trenton, Ont., 7 sp., June 22, July 17, (Evans).

Histerosia cartwrightiana Kearf. Trenton, Ont., 1 sp., June 27, (Evans).

5,496. *Cerostoma cervella* Wlsm. Departure Bay, B.C., (Young).

5,661. *Trichotaphe nonstrigella* Cham. Trenton, Ont., 6 dates, June 21-Sept. 23, (Evans).

Gelechia viduella Fab. Banff, Alta., 1 sp. (Sanson). An arctic species, very rarely found, described as *labradoriella* by Clemens, from specimens collected by Packard. There seems to be no other record of its capture since 1863, (W. D. K.).

5,818. *Gelechia ornatifimbriella* Clem. Trenton, Ont., 9 dates, June 14—July 2, (Evans).

Psilocorsis fletcherella Gibson. Ottawa, 2 sp. emerged from larvæ found on *Populus tremuloides* June 10, (Gibson).

6,110. *Scythris impositella* Zell. Ottawa, Mer Bleue, (Young).

6,495. *Tinea biflavimaculella* Clem. Trenton, Ont., 2 sp., July 3, Sept. 5, (Evans).

6,606. *Sthenopis thule* Strk. Macdonald College, Que., larvæ and pupæ found near here in bases of the stems of *Salix petiolaris,* June 29, (Swaine and Chagnon).

Coleoptera.

(Arranged according to Henshaw's List of the Coleoptera of America, North of Mexico).

28. *Cicindela fulgida* Say. Peachland, B.C., (Wallis).
30*a*. *Cicindela limbata* Say. Radisson, Sask., July 27, (Fletcher).
34*a*. *Cicindela terricola* Say. Westbourne, Man., Aug. 24, (Wallis). New to Manitoba.
167. *Loricera caerulescens* L. Aweme, Man., (Criddle).
305. *Bembidium carinula* Chd. Winnipeg Beach, Man., July 9, (Wallis).
351. *Bembidium lucidum* Lec. Winnipeg, Man., May 6, (Wallis).
569. *Pterostichus caudicalis* Say. Winnipeg, May 8, (Wallis).
623. *Amara avida* Say. Winnipeg, Sept. 9, (Wallis).
626. *Amara rufimanus* Kirby. Westbourne, Man., Aug. 5, (Wallis).
629. *Amara laticollis* Lec. Winnipeg, Aug. 8, (Wallis).
650. *Amara apricarius* Payk. Trenton, Ont., 4 specimens, July 4, 11, 23, Aug. 5, (Evans).
742. *Calathus gregarius* Say. Westbourne, Man., Aug. 14, (Wallis).
777. *Platynus anchomenoides* Rand. Aweme, Man., (Criddle).
804. *Platynus basalis* Lec. Aweme, Man., (Criddle).
836. *Platynus nigriceps* Lec. Radisson Sask., July 29, (Willing).
871. *Lebia divisa* Lec. Last Mountain Lake, Sask., June 5, (G. C. McBean).
898. *Lebia depicta* Horn. Makinak, Man. Record sent by Mr. Chagnon, of Montreal.

Colymbetes rugipennis Sharp. Winnipeg, Sept. 19, (Wallis). Mr. Roberts, of New York, who identified the species, writes: "You will find this placed as a synonym of *sculptilis;* this is an error. I can prove it to be a good species."

925. *Callida purpurea* Say. Wilkie, Sask., July 16, (Willing).
947. *Cymindis borealis* Lec. Aweme, Man., (Criddle).
1,450. *Agabus clavatus* Lec. Vernon, B.C., (Venables).
1,484. *Dytiscus marginicollis* Lec. Winnipeg, April 24. (Wallis).
1,500. *Graphoderes occidentalis* Horn. Winnipeg, (Wallis).
1,505. *Gyrinus minutus* Fab. Winnipeg, Sept. 11, (Wallis).
1,551. *Helophorus inquinatus* Mann. Winnipeg, May 5, (Wallis).
1,597. *Hydrocharis obtusatus* Say. Winnipeg, June 3, (Wallis).
1,679. *Cercyon unipunctatum* L. Regina, Sask., in house, Nov., (Willing).
1,729. *Choleva basillaris* Say. Aweme, Man., (Criddle).
1,735. *Ptomaphagus consobrinus* Lec. Aweme, Man., (Criddle).
1,743. *Ptomaphagus brachyderus* Lec. Aweme, Man., (Criddle).
1,866. *Ceophyllus monilis* Lec. Aweme, Man., (Criddle).

Coccidula occidentalis Horn. Aweme, Man., (Criddle).

2,098. *Quedius explanatus* Lec. Olds, Alta., in a turnip, Sept. 12, (Willing).
2,234. *Philonthus aurulentus* Horn. Vernon, B.C., (Venables).
3,037. *Megilla vittiger* Mann. Saskatoon, Sask., June 1; Olds, Alta., Sept. 12, (Willing).
3,072. *Harmonia 12-maculata* Gebl. Last Mountain Lake, Sask., 3 specimens, each a different colour, June 5, (G. A. McBean).

3,095*d*. *Brachyacantha albifrons* Say. Meota, north of Battleford, Sask., Aug. 8, (Willing).

3,122. *Hyperaspis 4-vittata* Lec. Last Mountain Lake, Sask., June 5, (G. A. McBean).

Hyperaspis inflexa Casey. Last Mountain Lake, Sask., June 5, (G. A. McBean).

3,189. *Mycetina testacea* Ziegl. Regina, Sask., Aug. 28, (Willing).

3,238. *Tritoma californica* Lec. Olds, Alta., (Willing).

3,355. *Telmatophilus americana* Lec. Aweme, Man., (Criddle).

3,421. *Dermestes talpinus* Mann. Olds, Alta., (Willing).

3,425*a*. *Dermestes signatus* Lec. Olds, Alta., (Willing).

3,477. *Hister harrisii* Kirby. Aweme, Man., June, July, (Criddle); Westbourne, Man., Aug., (Wallis).

3,505. *Hister sedecimstriatus* Say. Aweme, June, (Criddle).

3,508. *Hister perplexus* Lec. Aweme, Man., June, (Criddle).

3,615. *Saprinus seminitens* Lec. Aweme, Man., July, (Criddle).

3,617. *Saprinus fraternus* Say. Aweme, Man., July, (Criddle).

3,895. *Byrrhus murinus* Fab. Aweme, Man., (Criddle).

4,282. *Agriotes fucosus* Lec. Winnipeg, July 7, (Wallis).

4,322. *Melanotus fissilis* Say. Westbourne, Man., Aug. 14, Wallis).

4,382. *Pityobius anguinus* Lec. Winnipeg Beach, Man., July 9, (Wallis).

4,607*a*. *Buprestis langii* Mann. Banff, Alta., July 16, (Sanson).

4,810. *Lucidota atra* Fab. Norman, Ont., July 19, (Wallis).

5,235. *Gibbium scotias* Scop. Montreal, June, (Chagnon).

5,296. *Xyletinus lugubris* Lec. Aweme, Man., (Criddle).

5,337. *Endecatomus rugosus* Rand. Aweme, Man., (Criddle).

5,356. *Amphicerus bicaudatus* Say. Regina, Sask., Sept. 17, Oct. 6, (Willing).

5,428. *Canthon praticola* Lec. Mortlach, Sask., in dead gophers, May 31, (Willing).

5,705. *Diplotaxis obscura* Lec. Vernon, B.C., (Venables).

5,960. *Prionus pocularis* Dalm. Trenton, Ont., July 13, (Evans).

6,007. *Merium proteus* Kirby. Vernon, B.C., (Venables).

6,184. *Xylotrechus annosus* Say. Regina, Sask., June 12; Strathcona, Alta., May 20, (Willing).

6,253. *Anthophylax malachiticus* Hald. Mt. St. Hilaire, Que., May 24, (Chagnon).

6,266. *Acmæops subpilosa* Lec. High River, Alta, June 27, (Willing).

6,278. *Gaurotes cressoni* Bland. Vernon, B.C., on wild rose flowers, Aug., (Venables).

6,358. *Leptura scripta* Lec. Vernon, on wild rose, (Venables).

6,385. *Monohammus titillator* Fab. Trenton, Ont., Aug. 9, (Evans).

6,488. *Saperda moesta* Lec. Garden Hill, near Port Hope, Ont. Middle July, on poplar, (Morris).

6,489. *Saperda concolor* Lec. Bethel, near Port Hope, Ont. Middle June, on willow, (Morris).

6,659. *Pachybrachys litigiosus* Suffr. Aweme, Man., July 9, (Criddle).

6,684. *Pachybrachys nigricornis* Say. Aweme, Man., July 19, only one specimen taken, (Criddle).

6,707. *Diachus auratus* Fab. Aweme, Man., Aug. 18, 25, (Criddle).

6,742. *Chrysochus cobaltinus* Lec. Enderby, B.C., Aug. Several on heads of timothy grass, (Venables).

6,796. *Chrysomela conjuncta* Rog. Last Mountain Lake, Sask., June 5, (G. A. McBean).
6,968. *Haltica evicta* Lec. Aweme, Man., (Criddle).
7,032. *Mantura floridana* Cr. Aweme, Man., May 28, on *Rumex venosus,* (E. Criddle).
7,096. *Physonota unipunctata* Say. Qu'Appelle Valley, July, (Halkett).
7,402. *Haplandrus femoratus* Fab. Montreal, (Chagnon).
Vanonus wickhami Casey. Trenton, Ont., July 18, (Evans).
7,464. *Tribolium madens* Charp. Vernon, B.C., (Venables).
8,224. *Attelabus analis* Ill. Aweme, Man., (Criddle).
8,228. *Attelabus rhois* Boh. Aweme, Man., (Criddle).
8,334. *Scythropus elegans* Coup. Vernon, B.C., beaten from pine trees, (Venables).
8,430. *Phytonomus comptus* Say. Aweme, Man., on *Rumex venosus,* (Criddle); pupa on head of grass, Indian Head, emerged Regina, Sask., Aug. 1, (Willing).
8,540. *Grypidius equiseti* Fab. Winnipeg, Man., May 23, (Wallis).
8,641. *Anthonomus sycophanta* Walsh. Regina, Sask., June 10; reared from gall on willow leaf, Olds, Alta., Sept. 5, (Willing).
8,688. *Encalus decipiens* Lec. Aweme, Man., May 28, (Criddle).
8,943. *Limnobaris prolixa* Lec. Aweme, Man., (Criddle).
8,948. *Limnobaris prolexus* Lec. Aweme, Man., (Criddle).
9,199. *Hylurgops pinifex* Fitch. Winnipeg, May 9, (Wallis).
9,207. *Allandrus bifasciatus* Lec. Aweme, Man., (Criddle).
9,315. *Philhydrus hamiltoni* Horn. Norman, Ont., July 19, (Wallis).
Actium retractum Casey. Queen Charlotte Island, B. C., (Keen).
Oropus keeni Casey. Metlakatla, B.C., (Keen).
Oropus brevipennis Casey. Metlakatla, B.C., (Keen).
Batrisodes albionicus Aubé. Metlakatla, B.C., (Keen).
Baryodma rotundicollis Casey. Queen Charlotte Island, B.C., (Keen).
Baryodma insulana Casey. Queen Charlotte Island, B.C., (Keen).
Eucharina sulcicollis Mann. Queen Charlotte Island, and Metlakatla, B.C., (Keen).
Megista granulata Mann. Queen Charlotte Island, B.C., (Keen).
Thinusa fletcheri Casey. Queen Charlotte Island, B.C., (Keen).
Amblopusa borealis Casey. Queen Charlotte Island, (Keen).

Diptera.

(Arranged according to a Catalogue of North American Diptera, by J. M. Aldrich, Smithsonian Misc. Coll. XLVI., No. 1,144. The numbers refer to the pages of the catalogue.)

Collectors who other years devoted a good deal of time to these insects have omitted to send in records. It is hoped, however, when the past season's collections are worked up, that notes relating to the rarer species will be sent for inclusion in next year's Record.

87. *Chionea nivicola* Doane. Banff, Alta., on snow, March 29, (Sanson).
105. *Dixa centralis* Loew. Banff, Alta., June 22, (Sanson).
Anopheles occidentalis D. & K. Valley of Mayo River, Y.T., Lat. 63° 45′, Long. 136°, 1904, (Keele). Probably the most northerly record for an *Anopheles* (H. G. D.); Aweme, Man., April 23, 24, (Criddle).

127. *Aedes canadensis* Th. Youghall, N.B., July, (Gibson).
129. *Culiseta impatiens* Walk. Valley of Mayo River, Y.T., Lat. 63° 45′, Long. 136°, 1904, (Keele).
129. *Culiseta inornatus* Will. Aweme, Man., May 17, 21, Sept. 27, Oct. 12, 14, (Criddle).
131. *Aedes provacans* Walk. Youghall, N.B., July, (Gibson).
Aedes sansoni D. & K. Banff, Alta., June 22, (Sanson).
Aedes punctor Kirby. Banff, Alta., June 22, (Sanson).
Aedes pagetonotum D. & K. Ottawa, May 20, 1905, (Fletcher); Chelsea, Que., May 17, (Gibson); Aweme, June 3, (Criddle).
Aedes riparius D. & K. Aweme, Man., June 1, 2, 24, (Criddle).
131. *Aedes sylvestris* Th. Aweme, Man., June 25, July 19, (Criddle); Youghall, N.B., July, (Gibson).
133. *Aedes spenceri* Th. Aweme, Man., May 17, June 10, (Criddle).
Mansonia perturbans Walk. Aweme, Man., June 30, (Criddle).
182. *Stratiomyia badia* Walk. Beaver Lake, Alta., July, (Halkett).
185. *Odontomyia binotata* Loew. Aweme, Man., Aug. 25, (Fletcher).
359. *Platychirus chætopodus* Will. Metlakatla, B.C., (Keen).
360. *Melanostoma angustatum* Will. Kaslo, B.C., Aug. 16, (Fletcher).
363. *Didea laxa* O.S. Fort Simpson, B.C., Aug. 18, (Keen).
365. *Syrphus diversipes* Macq. Hampton, P.E.I., Aug. 20, (Gibson).
Syrphus perplexus Osburn. Millie Lake, Hudson Bay Slope, July 27, (Wilson).
367. *Syrphus protritus* O.S. Metlakatla, B.C., (Keen).
368. *Syrphus xanthostoma* Will. Hampton, P.E.I., Aug. 20, (Gibson); Ottawa, Sept. 4, (Groh).
382. *Sericomyia chrysotoxoides* Macq. Youghall, N.B., July 6, (Gibson).
393. *Helophilus hamatus* Loew. Ottawa, May 13, (Fletcher).
568. *Scatophaga furcata* Say. Banff, Alta., on Sulphur Mountain, May, (Sanson).

Hemiptera.

In this order some good work has been done during the year by Mr. Geo. A. Moore, of Montreal. Other collectors who previously have devoted considerable time to collecting hemiptera have either omitted to send in records, or have not as yet been able to work up their season's catch. Mr. Moore spent the latter half of July at North Hatley, Que., and among the material which he collected the following, although most of the species may not be particularly uncommon, are of interest, as few definite records from that part of the Province of Quebec are available. All the specimens were collected between the 17th and 31st July, at North Hatley, and were not of common occurrence:

Entilia sinuata, Fab.
Lamenia vulgaris, Fitch.
Laccocera vittipennis, Van D.
Pissonotus marginatus, Van D.
Aphrophora quadrinotata, Say.
Agallia 4-punctata Prov.
Oncometopia lateralis Fab.
Gypona quebecensis Prov.
Corimelaena unicolor, P. B.
Perillus circumcinctus, Stal.
Homoemus aeneifrons, Say.
Podisus modestus, Dall.
Mormidea lugens, Fabr.
Peribalus limbolaris, Stal.
Elasmostethus cruciata, Say.
Corizus nigrosternum, Sign.
Corizus novae-boracensis, Sign.
Nysius angustatus, Uhl.
Oedancala dorsalis, Say.
Lopidea media, Say.
Resthenia insignis, Say.
Lygus pabulinus, L.

Neurocolpus nubilis, Say.
Poeciloscytus basalis, Reut.
Capsus ater, L.
Dicyphus famelicus, Uhl.
Diaphnidia pellucida, Uhl.
Pilophorus amoenus, Uhl.
Rhinocapsus vanduzei, Uhl.
Coriscus subcoleoptratus, Kirby.
Gerris rufoscutellatus, Latr.
Rhagovelia obesa, Uhl.
Salda ligata, Say.
Salda pallipes, Fabr.

Besides the above, the following records are of interest, those species taken by Mr. Metcalfe, being new to the Ottawa list:

Livia maculipennis Fitch. Ottawa, on pine, April 30, (Metcalfe).

Livia vernalis Fitch. Ottawa, on pine, April 30, (Metcalfe).

Aphalara calthae Linn. Hull, Que., May 10, (Metcalfe).

Aphalara marginata Harris. Hull, Que., June 7, (Metcalfe).

Psylla carpini Fitch. Hull, Que., on ironwood, Aug. 25, (Metcalfe).

(The above species of Psyllidae were named by Mr. E. A. Schwarz, of Washington. A number of other species besides these were collected, but Mr. Schwarz reported them to be undescribed.)

Gypona albosignata Uhl. Trenton, Ont., Sept. 5, 1 sp., rare, (Evans).

Athysanus striola Fall. Trenton, Ont., June 18, 2 sp., rare, (Evans).

Athysanus instabilis Van D. Trenton, Ont., 5 sp., June 23, July 21, 23, 28, Aug. 1, (Evans).

Sehirus cinctus P. B. Large numbers of this insect were seen by Miss A. M. Rand, at Canaan, N.S., in early April, chiefly being clustered on old leaves under, and near, apple trees. Its occurrence in such large numbers seems to me should be recorded, as it is not a common habit among the Pentatomidæ. Mr. Van Duzee says this is the second instance known to him of this insect appearing in large numbers.

Corynocoris distinctus Dall. Sudbury, Ont.; Eldorado, Ont., Sept. 1, (Evans).

Alydrus pluto Uhler. Crow's Nest Pass, B.C., (W. S. Drury).

Alydrus conspersus Mont. Trenton, Ont., (Evans).

Alydrus scutellatus Van D. Crow's Nest Pass, B.C., (W. S. Drury).

Protenor belfragei Hagl. Sudbury, Ont.; Eldorado, Ont., Sept. 1, (Evans).

Phlegyas abbreviatus Uhler. Belleville, Ont., (Evans).

Corizus crassicornis L. Sudbury, Ont., June 23; Hastings Co., Ont., June 26, (Evans).

Cymus luridus Stal. Trenton, Ont., Aug. 17, (Evans).

Ligyrocoris diffussus Uhler. Trenton, Ont., Sept. 1, (Evans).

Ligyrocoris contracta Say. Crow's Nest Pass, B.C., (W. S. Drury).

Geocoris bullatus Say. Belleville, Ont., (Evans); N.W.T., (J. Macoun); Crow's Nest Pass, B.C., (W. S. Drury).

Resthenia insitiva Say. Belleville, Ont., (Evans).

Diaphnidia debilis Uhler. Trenton, Ont., Sept. 3, (Evans).

Labops burmeisteri Stal. Sudbury, Ont., 1 sp., (Evans). Mr. Van Duzee remarks, " is new to the Canadian list, and, in fact, new to this continent, so far as published records are concerned. I have seen one more specimen, which was taken in the Adirondacks last summer. It was described from specimens taken in Siberia and Kamschatka."

Reduviolus roseipennis Reut. Trenton, Ont., June 7, Sept. 16, (Evans).

Pygolampis pectoralis Say. Trenton, Ont., (Evans).

Orthoptera.

During 1909, Dr. E. M. Walker has examined several small collections of Orthoptera for Canadians. Among these are some species which he considers should

Labia minor Burm. Aweme, Man., June 18, 28, 29, 3 males, 2 females; Sept. 11, 5 males, 2 females, (Criddle).

Chloealtis abdominalis Thomas. Regina, Sask., Sept. 5, 1 female, macropterous, (Willing).

Arphia xanthoptera Burm. There is a specimen of this insect in the collection of the late Dr. Wm. Brodie, labelled Toronto, 1880. It does not appear to be found about Toronto at the present time, but will doubtless be found on the southern strip along Lake Erie. New to Canada, (E. M. W.).

Spharagemon bolli Scudd. Aweme, Man., July 27, 1904, 1 female, (Criddle).

Spharagemon collare Scudd. Aweme, Man., Aug. 2, 1904, 1 male, (Criddle). This specimen is remarkably uniform in coloration, closely resembling *S. bolli* in appearance, (E. M. W.).

Ceuthophilus latens Scudd. There is a male of this species in the collection of the Ontario Agricultural College, Guelph, labelled, London, Ont. New to Canada, (E. M. W.).

Oecanthus quadripunctatus Beut. Aweme, Man., Aug. 21, 26, (Criddle).

Odonata.

Dr. E. M. Walker, of Toronto, has been good enough to send the following notes, all of which he thinks are worthy of recording in the Record:

Calopteryx aequabilis Say. Kenogami River, Hudson Bay Slope, Ont., July 7, 8, Aug. 7, 8, 1904, 4 males (Wilson). These specimens are somewhat stouter than those from more southern localities. They belong to the form described by Hagen as *C. hudsonica.*

Agrion resolutum Selys. Regina, Sask., June 20, (Willing).

Ischnura cervula Selys. Peachland, B.C., Aug. 20, (Wallis).

Ophiogomphus occidentis Hagen. Peachland, B.C., Aug. 6, 2 males, Aug. 17, 1 female, July 8, 1 male, (Wallis). New to Canada, (E. M. W.).

Gomphus descriptus Banks. Guelph, Ont., May 27, 1908, 1 male, (A. W. Baker). New to Canada, (E. M. W.).

Gomphus externus Selys. Aweme, Man., June 22, 1 male, (Criddle); Winnipeg, Man., (Wallis). New to Canada, (E. M. W.).

Aeshna umbrosa Walker. Winnipeg, Man., Sept. 6, (Wallis).

Aeshna eremita Scudder. Peachland, B.C., Aug. 3, 2,500 ft., 1 female; Aug. 7, 1 female, (Wallis).

Aeshna sitchensis Hagen. Winnipeg, Man., Sept. 6, 1 male, (Wallis).

Macromia magnifica Selys. Peachland, B.C., July 24, 31, 2 males (Wallis). Determined by Mr. E. B. Williamson. New to Canada, (E. M. W.).

Tetragoneuria canis McLachlan. Sudbury, June 26, 1892; June 11, 1893, 2 males, (Evans).

Somatochlora albicincta Burm. Aweme, Man., June 22, 1 female, (Criddle).

Cordulia shurtleffi Scudder. Sudbury, Ont., June 11, 1893, 2 males, (Evans).

Leucorhinia frigida Hagen. Sudbury, Ont., June 26, 1892, 1 male, 1 female, (Evans).

Leucorhinia hudsonica Selys. Winnipeg, June 19, 1 male, 2 females, (Wallis).

Leucorhinia proxima Calvert. Winnipeg, June 19, 1 male, (Wallis).

Leucorhinia borealis Hagen. Banff, Alta., (Sanson); again taken at Aweme, Man., June 4, 9, 2 females, (Criddle).

Leucorhinia intacta Hagen. Winnipeg, June 19, 2 males, (Wallis).

In addition to the above, Dr. Walker has written that he has several undetermined species received from Mr. J. B. Wallis, of Winnipeg, Man. Most of these

have been examined, also, by Mr. E. B. Williamson, but seem for the most part to be undescribed. They include an *Argia* from Peachland, B.C., (several specimens), a single female of a peculiar *Gomphus,* from the same locality, and 3 females of a *Somatochlora,* related to *franklini* and *macrotona,* but probably distinct. Dr. Walker also adds: "Among a number of Odonata used for class purposes, in the collection of the Ontario Agricultural College, Guelph, are a single *Perithemis domitia* Drury, and several specimens each of *Libellula vibrans* Fab., and *L. auripennis* Burm. These specimens are unlabelled, but Mr. Caesar, of the Entomological Department, thinks that they were certainly taken in the vicinity of Guelph. They cannot be recorded as undoubted inhabitants of Ontario, but should be looked for by collectors in the southern part of the province.

Neuropteroid Insects. (Except Odonata.)

With the publication of the list of some Canadian neuropteroid insects, exclusive of Odonata, in the Record for 1908, it was hoped that more work would be done in these groups in 1909. Mr. J. B. Wallis, of Winnipeg, has made another small collection, but all of these have not, as yet, been worked up. During the past year a miscellaneous lot of specimens has been determined by Dr. Banks, and it has been thought advisable, owing to the few authentic records of these insects in Canada, to include the entire list. There is much work to be done yet before we will have even a fair idea of the range of species which occur in Canada. The numbers below refer to the pages in Banks' Catalogue, published in 1907, by the American Entomological Society.

Archiptera.

15. *Polymitarcys albus* Say. Winnipeg, Man., Sept. 6, (Wallis).

15. *Hexagenia bilineata* Say. Norman, Ont., July 19, (Wallis).

16. *Hexagenia limbata* Pict. Winnipeg, July 3, (Wallis); Norman, Ont., subimagoes, July 19, (Wallis).

16. *Ephemera simulans* Walk. Ottawa, June 5, (Groh); Norman, Ont., July 19, (Wallis).

20. *Heptagenia interpunctata* Say. Norman, Ont., July 19, (Wallis).

21. *Heptagenia terminata* Walsh. Norman, Ont., July 19, (Wallis).

27. *Chrysopa chlorophana* Burm. Winnipeg, Man., Sept. 8, (Wallis).

27. *Chrysopa coloradensis* Banks. Peachland, B.C., Aug. 8, (Wallis).
Meleoma verticalis Banks. Penticton, B.C., Aug. 11, (Wallis).

29. *Myrmeleon immaculatus* De G. Penticton, B.C., Aug. 11, (Wallis).

30. *Brachynemurus abdominalis* Say. Okanagan Falls, B.C., Aug. 13, (Wallis).

31. *Brachynemurus brunneus* Currie. Peachland, B.C., Aug., (Wallis).

Neuroptera.

33. *Panorpa rufescens* Ramb. Ottawa, July 14, (Gibson).

Trichoptera.

35. *Phryganea cinerea* Walk. Rostrevor, Ont., Sept. 11, (Gibson); Regina, Sask., July 15, (Fletcher); Winnipeg, Man., June 25, (Wallis).

35. *Phryganea vestita* Walk. Sable Island, Aug. 16, (collector unknown).

35. *Neuronia angustipennis* Hagen. McLeod, Alta., June 30, (Fletcher).

35. *Neuronia postica* Walk. London, Ont., July 7, (A. P. Saunders).

36. *Limnephilus luteolus* Banks. Peachland, B.C., Aug. 8, (Wallis).

37. *Limnephilus submonilifer* Walk. Ottawa, Sept. 19, (Gibson), Sept. 26, (Letourneau); Rostrevor, Ont., Sept. 5, (Gibson).

38. *Pycnopsyche scabripennis* Ramb. Rostrevor, Ont., Sept. 4, (Gibson).
39. *Stenophylax pacificus* Banks. Peachland, B.C., Aug. 21, (Wallis).
39. *Platyphylax subfasciata* Say. Ottawa, Sept. 21, (Letourneau).
Platyphylax alaskensis Banks. Bartlett Bay, off Glacier Bay, Alaska, June 1, (Nelles).
41. *Apatania pallida* Hagen. Winnipeg, Man., Oct. 1, (Wallis).
42. *Brachycentrus nigrisoma* Banks. Winnipeg, Man., May 28, (Wallis).
45. *Molanna cinerea* Hagen. Rostrevor, Ont., Sept. 2, (Gibson).
45. *Triaenodes flavescens* Banks. Ottawa, June 25, (Gibson).
46. *Mystacides sepulchralis* Walk. Ottawa, Aug. 8, (Fletcher); Norman, Ont., July 19, (Wallis).
47. *Macronema zebrata* Hagen. St. Anne de Bellevue, Que., July 23, (Fletcher).
47. *Hydropsyche scalaris* Hagen. Norman, Ont., July 19, (Wallis).
47. *Hydropsyche sordida* Hagen. Ottawa, July 15, (Gibson).

Araneida.

The Rev. J. H. Keen, of Metlakatla, British Columbia, made a small collection of spiders, which were submitted to Dr. Nathan Banks. The list of determinations is of interest, owing to the locality, and to the fact that it adds considerably to the known range of some of the species. Dr. Banks considers the records all worth publishing. Unfortunately, no dates are given on which the specimens were collected. There is a good deal of work to be done yet in Canada in finding out what species of spiders we have, and many of our collectors, particularly those living in little worked localities, could help very much in adding to the known distribution of these creatures. The following, all of which were found at Metlakatla, constitute the list:

Epeira patagiata, Clerck.
Epeira displicata, Htz.
Epeira californiensis, Keys.
Zilla californica, Bks.
Labulla altioculata Keys. Not common, (N. B.).
Linyphia phrygiana, Koch.
Linyphia marginata, Koch.
Pedanostethus laticeps Keys. Previously known to me by a few specimens only, (N. B.).
Lophocarenum florens, Cambr.
Tetragnatha extensa, Linn.
Tetragnatha laboriosa, Hentz.
Apostenus cinctipes, Banks. Previously known to me by a few specimens only, (N. B.).
Clubiona pacifica, Banks.
Thanatus rubicundus, Keys.
Cybaeus reticulatus, Simon.
Amaurobius pictus, Simon.
Lycosa brunneiventris, Banks.
Pardosa glacialis, Thorell.
Dendryphantes bifida, Banks.
Sclerobunus brunneus, Banks.
Ideobisium threveneti, Simon.

IN MEMORIAM—DR. WILLIAM BRODIE.

We regret to have to record the death of another veteran entomologist, in the person of the late Dr. William Brodie, who has recently been contributing a series of articles on galls found in the neighborhood of Toronto. On Saturday, July 31st, he complained of feeling unwell on his return to his home, and a few days later became seriously ill. On Friday, August 6th, he expired. He was born in Peterhead, Aberdeen, Scotland, and came out to Canada with his parents when a child. His father settled on a farm in the County of York about thirty miles from Toronto, and there hewed out of the forest a home for his family. From his earliest years Dr. Brodie exhibited an ardent love of nature in all its aspects, and became an omnivorous reader. This habit formed in childhood continued with him throughout his life. While fitting himself for the profession of dentistry he taught school for a time and became one of the first graduates of the Dental College in Toronto. There he practised his profession very successfully for a long series of years. In 1903, he gave up his work and took charge of the Biological Department of the Provincial Museum. While fully occupied during most of his time with the work of his profession, he most industriously devoted every spare moment to his much-loved study of Entomology. Galls and their inmates had a special fascination for him, and he made large collections of these and many other forms of insect life. His enthusiasm was infectious and inspired many of his younger friends with a love for nature, and especially for the collection and observation of insects. He died at the good old age of seventy-eight years and will be very much missed, not only by the members of his family, but by a large circle of friends. His work at the Museum was most congenial to him, and gave him a happy occupation when his age prohibited him from carrying on his ordinary work. Of his family of six children, three daughters alone survive. To them we extend our deepest sympathy.

I.

Ah! you who own the sovereign sway
Of commerce and the busy mart,
You knew him not, he lived apart,
The King who passed in state to-day.

A king who recked not worldly gear,
A pauper—you who rate by gold,
But rich in knowledge manifold,
In Nature's store without a peer.

He lived his threescore years and ten;
He had his court of liegemen true;
They loved him like that chosen few
Who served the Master scorned of men.

"He is no king of ours," you say,
"We know him not," yet bare the head.
Pay you your tribute, he is dead,
I saw him pass in state to-day.

II.

To bow the knee he was not planned
With willowy grace and pliant form;
Like stalwart oak he faced the storm
And bore the brunt—a monarch grand.

A shock of rebel locks upreared
Above the forehead bold and high;
Neath shaggy brow the deep-set eye
Challenged enquiry; grizzled beard

Part hid his dip, a man endued
With power of thought, you read the face,
The Maker moulds in some for grace,
For strength those rugged features hewed.

In mind and will maturest man,
A boy at heart; his eager quest
Of Nature's ways the boy confessed,
But through it all endurance ran.

Bend as they might the sturdy frame
And quell the lustre of the eye,
Not years could daunt the purpose high
Or quench the ardent spirit's flame.

III.

Greybeard and youth, a thoughtful throng,
Would gather round him Scottish sage,
Right gladly would give place to age,
Listen and learn and ponder long.

Was life's dark riddle hard to read?
His vibrant tones would cheer. Were
there
Who questioned truth? who fought
despair?
He welcomed all, nor asked their creed.

Did they in earnest seek? He sought
In earnest too. From bounteous store
He loved with lavish hand to pour
Jewels of knowledge and of thought.

Responsive hearts, unwavering eyes
His steadfast gaze compelled again;
He loved the truth, his speech was plain,
He could not stoop to compromise.

IV.

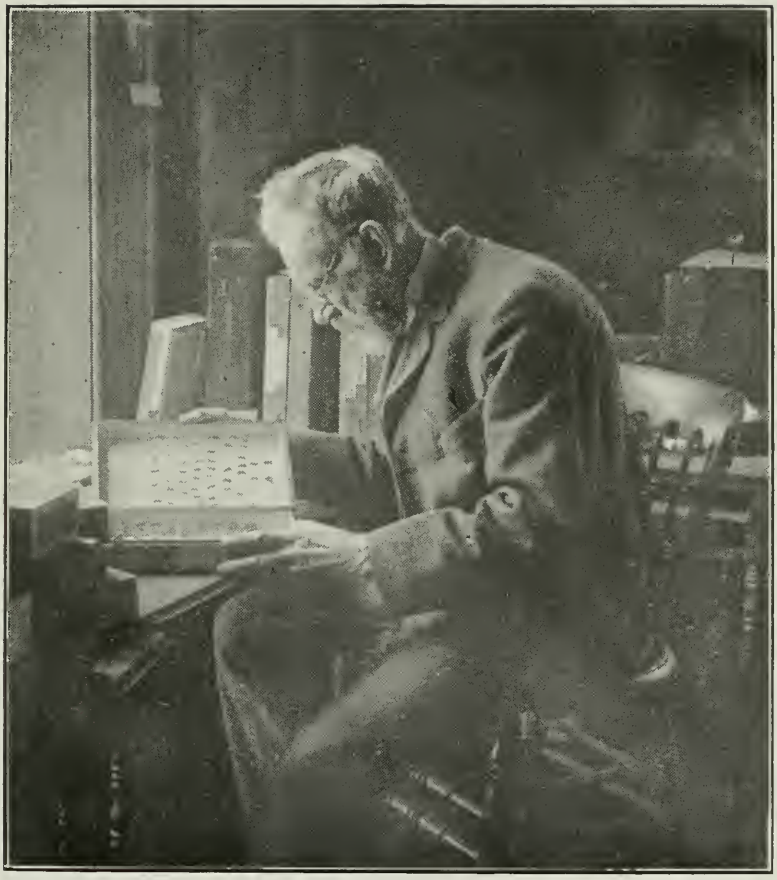
Oh! all too rare the thoughtful mind
That keeps abreast of Science way,
And still reveres the older day,
The simpler faith that lags behind.

Dead now, but while the ages run
His work shall live; 'tis such as he
Alone inspire posterity,
Fathering their kind from son to son.

We know not when our days are sped,
And I, who through his friendship stand,
Would lift some falterer by the hand
Ere I lie nerveless with the dead.

Trinity College School, Port Hope.

—Frank Morris.



THE LATE DR WM. BRODIE.

PLATE A.

1. Vein Gall on White Ash. *Eriophyes sp.*
2. Chokecherry Mite Gall. *Eriophyes sp.*
3. Hawthorn Serpentine Gall. *Eriophyes sp.*
4. Manitoba Maple Wart Gall. *Eriophyes sp.*
5. Poison Ivy Mite Gall. *Eriophyes sp.*
6. Birch Bud Gall. *Eriophyes sp.*

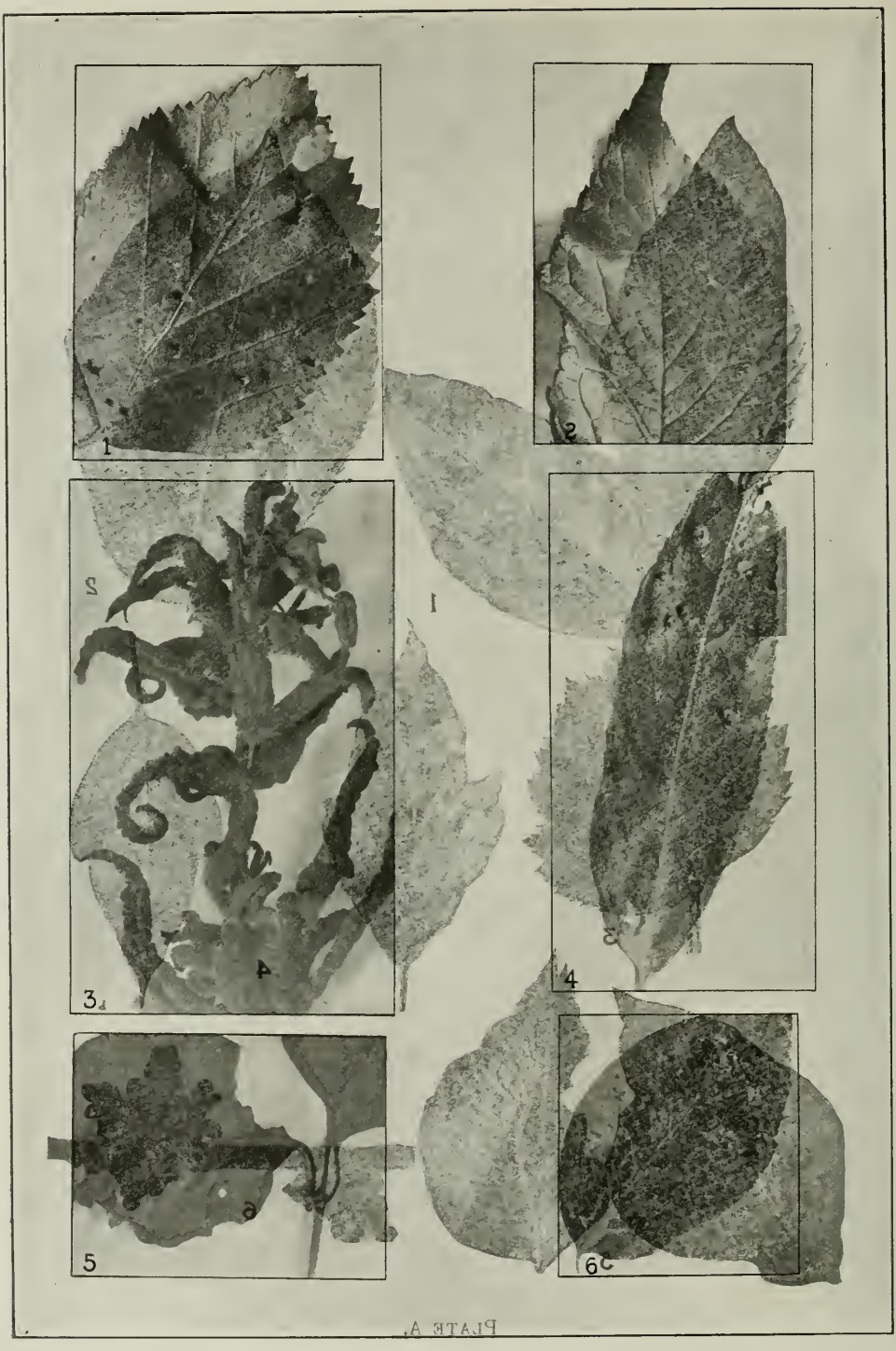


PLATE B.

1. Eriophyes sp., Betula papyrifera.
2. Eriophyes sp., Prunus Americana.
3. Eriophyes sp., Rhus Cotinus.
4. Eriophyes sp., Salix discolor.
5. Eriophyes cephalanthæ, Cephalanthus occidentalis.
6. Eriophyes pyr sp., Pyrus communis.

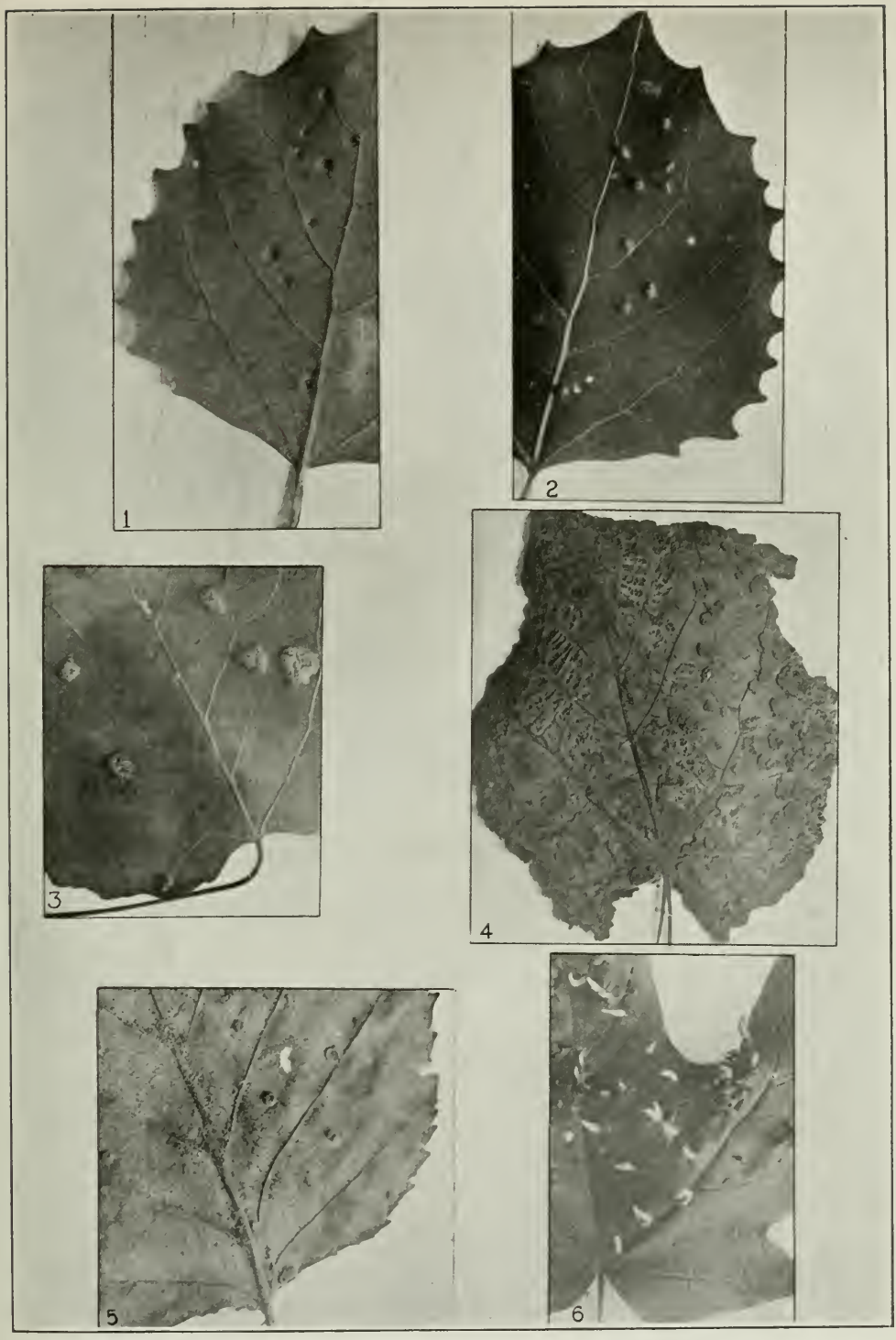


PLATE C.

1. Eriophyes sp., (under surface) Populus grandidentata.
2. Eriophyes sp., (upper surface) Populus grandidentata.
3. Eriophyes sp., Populus tremuloides.
4. Eriophyes sp., Tilia Europea.
5. Eriophyes sp., Betula papyrifera.
6. Phlœcoptes aceris, Acer saccharinum.

PLATE D.

1. Sugar Maple Pink Frost Gall. *Eriophyes sp.*
2. Manitoba Maple Frost Gall. *Eriophyes sp.*
3. Rock Elm Frst Gall. *Eriophyes sp.*
4. Beech Frost Gall. *Eriophyes sp.*
5. Elm Mite Gall. *Eriophyes ulmi.*
6. Elm Mite Gall. Enlarged opening on under surface.

PLATE D.

1. Sugar Maple Pink Frost Gall. Eriophyes sp.
2. Manitoba Maple Frost Gall. Eriophyes sp.
3. Rock Elm Frost Gall. Eriophyes sp.
4. Beech Frost Gall. Eriophyes sp.
5. Elm Mite Gall. Eriophyes ulmi.
6. Elm Mite Gall. Enlarged opening on under surface.

PLATE E.

1. Eriophyes sp., Amelanchier Canadensis.
2. Eriophyes sp., Juglans nigra.
3. Eriophyes sp., Populus italica.
4. Eriophyes sp., Vitis cordifolia.
5. Eriophyes sp., Salix fragilis.

Fig. 1.—The House-Fly, *Musca domestica*, L. Female.

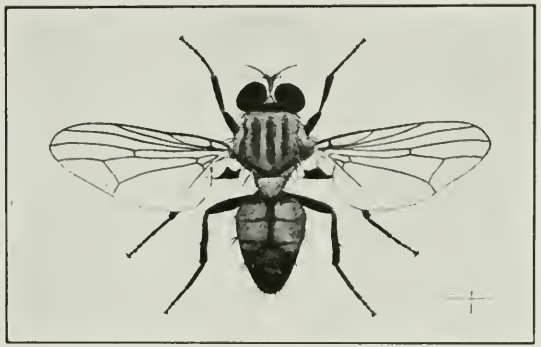


Fig. 2.—The Lesser or Small House-Fly, *Homalomyia canicularis*, L. Male.

Fig. 3.—Full-grown Larva or "Maggot" of *Musca domestica*.

Fig. 4.—Colonies of Bacteria obtained by allowing a fly caught in the open to walk over a culture plate.

PLATE F. (See page 36.)

PLATE F. (See page 38.)

Fig. 1.—Type House-fly. Musca domestica, L.
Female.

Fig. 2.—Type Lesser or Small House-fly.
Musca domestica var. L. Male.

Fig. 3.—Full-grown Larva or "Maggot" of
Musca domestica.

Fig. 4.—Colonies of Bacteria optimized by
allowing a fly caught in the open to
walk over a culture plate.

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ANNUAL REPORT

OF THE

Bee-Keepers' Association

OF THE

Province of Ontario

1909

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

PRINTED BY ORDER OF

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1910

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29-37 Richmond Street West,
TORONTO

To the Honourable JOHN MORISON GIBSON, K.C., LL.D., etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the pleasure to present herewith for the consideration of Your Honour, the Report of the Ontario Bee-keepers' Association for 1909.

Respectfully submitted,

JAMES S. DUFF,

Minister of Agriculture.

Toronto, 1910.

Ontario Bee-Keepers' Association.

Officers for 1910.

President: Wm. Couse, Streetsville.
First Vice-President: W. J. Craig, Brantford.
Second Vice-President: W. A. Chrysler, Chatham.
Secretary-Treasurer: P. W. Hodgetts, Toronto.

Directors: District No. 1, Alex. Dickson, Lancaster; District No. 2, A. McLaughlin, Cumberland; District No. 3, H. E. Eyre, Chantry; District No. 4, C. P. Chisholm, Wallbridge; District No. 5, James Storer, Lindsay; District No. 6, Wm. Couse, Streetsville; District No. 7, J. F. Switzer, Orangeville; District No. 8, U. H. Bowen, Niagara Falls; District No. 9, W. J. Craig, Brantford; District No. 10, D. Chalmers, Poole; District No. 11, W. A. Chrysler, Chatham; District No. 12, Henry Johnson, Craighurst.

Ontario Agricultural College: Morley Pettit, O.A.C., Guelph.

Committees:

Horticultural Show: President and Secretary, with E. Grainger and H. G. Sibbald.
Honey Crop: President and Secretary, with W. J. Craig and H. G. Sibbald.
Transportation: President and Secretary, with J. D. Evans.
Revising: H. G. Sibbald, Morley Pettit.

Representatives to Fair Boards:

Toronto Industrial: J. D. Evans, Islington.
Ottawa Central: W. J. Brown, Chard.
London Western: F. J. Miller, Ealing P.O., London.

Treasurer's Report.

Receipts.

Cash on hand Jan. 1st. 1909.....	$9 24
Membership fees	198 90
Legislative grant	425 00
Affiliated societies dues	55 00
Balance due Treasurer	64 26
	$752 40

Expenditures.

Grants to other societies, fairs, etc.	$249 98
Expenses for convention or regular meetings	43 50
Officers' salaries	25 00
Directors' fees and expenses	50 80
Postage and stationery	14 57
Printing	42 25
Advertising	24 00
Periodicals for members	184 36
Cost of reporting	75 00
Labor at Honey Show	9 00
Affiliation fee, Horticultural Exhibition Association	5 00
Railway expenses of committees.	28 96
	$752 40

Martin Emigh,
Treasurer.

Audited and found correct, Nov. 10th, 1909.

W. G. Lindsay,
Auditor.

ONTARIO BEE-KEEPERS' ASSOCIATION.

The Annual Meeting of the Ontario Bee-keepers' Association was held in the County Council Chamber in the City of Toronto, on Wednesday, Thursday and Friday, November 10th, 11th and 12th, 1909.

PRESIDENT'S ADDRESS.

By William Couse, Streetsville.

As bee-keepers, as an Association, as citizens of the Province of Ontario, we have a great deal to be thankful for. We have been able to secure an excellent crop of honey of the best quality and realize on it a good price and with quick sales. From information gathered the greater part of the honey has gone out of the bee-keepers' hands and much of it out of the Province to the west, where there is such a growing demand. As bee-keepers we can well afford to increase our stock of bees to fill the want that seems beyond our present powers to fill, as from information gathered many bee-keepers sold short and have been trying to purchase from their neighbours, who are also short. This has not always been the case at this early date. The quality of our honey has had much to do with bringing this about. We must not be satisfied with the present standard, but keep on raising it to greater perfection. We believe it has no superior at present. To use the words of a very large buyer who is particularly fond of honey, and has opportunity of testing the honeys of many different countries, none is its equal. As the production of honey is beneficial to other industries, such as fruit growing, horticulture and clover seed growing, bee-keeping may well be considered an asset and benefit to the Province of no small amount.

As an Association we have every reason to congratulate ourselves on reaching the high level which we have attained. We have an Association of considerable importance, its members being drawn from all parts of the Province, thereby raising the standard and increasing the knowledge of bee-keeping the Province over.

We have a foul brood law which is recognized and copied by other countries, which has been the means of keeping down, and we hope will finally eradicate this dreaded disease. To accomplish this we have now fourteen inspectors of apiaries appointed from among the very best bee-keepers of the Province, who are imparting a general knowledge of bee-keeping on every line, as well as on the foul brood.

We have now at Jordan Harbour a Government apiarist, whose duty it is to make experiments in all matters for our benefit, and also to lecture and demonstrate to pupils on apiculture at the Ontario Agricultural College at Guelph. We believe that this appointment will help us greatly in reaching definite conclusions by experiments in many points. One of the things he might do would be to import queens direct from other countries, and give us the benefit of their breeding by distributing them over the Province when the stock proves good.

We have a crop report committee which we believe has been of great value to the members of the Association, and to what extent some have very little knowl-

edge, particularly those who are not members of the Association. We feel that there are many bee-keepers who should be members of the Association, and they are cordially invited to become such.

For six years we have joined with the Fruit, Flower, and Vegetable Growers' Association in making a combined exhibit of our different products. This may not seem of very great importance at first sight, but we believe that Toronto is the greatest honey consuming city in America, as at present almost all wholesale and retail grocers of any importance handle it, whereas twenty-five years ago the druggists handled the greater part of it. We believe this has become so from the fact that the honey has been exhibited here as nowhere else for all these years.

All this has been accomplished, not only by the officers and members of the past one, two, three or more years, but by the assistance of the original promoters of the Association, and we are now reaping what they sowed; therefore, let us do something for those who follow us.

As citizens we feel that we are being treated fairly and liberally by the Provincial Government in the matter of financial assistance—greater than ever before; and if we do our duty and prove our worthiness, we can hope that our worthy secretary, who is so closely connected with the Department of Agriculture, will care for our interests in the future as he has done in the past and greater developments may be looked for each year.

In holding the position of President for the past year I have felt it a great honour conferred on me by the members of the Association, and I can assure you that in every particular all our Association work has been of the most pleasant nature.

There is one officer that I regret decided a year or more ago that it was his duty to resign, that is our old associate and friend, Martin Emigh, the treasurer, who has kept us afloat and in a direct line for so many years. I am sure you all regret this separation, and had you been as closely associated with him as I have been for a quarter of a century, you would know more of his worth personally, and as an Association worker. There is no record against him for kicking over the traces in all these years.

In conclusion you are all cordially invited to take part in the discussions at each and every session of this convention, so that we may be greatly benefitted by being present, and this invitation is not only to our own bee-keeping friends, but to those from across the border, whom we are so pleased to have with us. We will be benefitted by their presence in friendship as well as business.

Mr. H. G. Sibbald, in replying to the President's address, said: On the honey situation the President takes occasion to congratulate us on the good prices obtained and the good market, and that honey is practically scarce so early in the season. That is a fact we are all very glad to know. I believe that the dark days in honey selling have passed over and honey is becoming more and more a table article. People seem to forget about putting up preserves and take honey; it is easier, and I am glad that it is easier.

The President mentioned the foul brood situation. It seems a curious thing to me that after all the help we have had on this foul brood question, and the more we find out, it is almost an impossible thing to get rid of. I do not know whether I feel just as jubilant about getting rid of it to-day as I did three years ago. It seems almost impossible to get rid of that dread disease.

We can congratulate ourselves that we have had a great deal more help, and that we perhaps will get more help in the future. I hope we will.

Then our experimental apiary has been inaugurated this year, and Mr. Pettit is on hand to help us out with anything that troubles us. I hope that emphasis will be laid on training young bee-keepers so that we will be able to get help when we want it.

Then as to the bringing in of queens, there is a good field there for an experimental apiarist. People come to convention here, and they are bewildered by the difference of opinion of different bee-keepers, and some of them go back home and do not know hardly what to think. If Mr. Pettit will take all these differences down and solve them, and prove who is wrong and who is right, that will be a great help to us.

The Crop Committee Report has been mentioned as being of great value. That will likely receive attention later.

The Horticultural Show is another gift from the Department of Agriculture. It should be a great help to bee-keepers. I think exhibitions of honey always advertise and do good, and I think those men who are exhibiting honey do more or less good to the whole fraternity.

Mr. F. J. Miller, in replying to the President's address, said: In the selling of honey I think there is a bright outlook, as has been mentioned, and the markets are firm, and I think we can trace this back to our Crop Committee as having done good work for us, and the Department of Agriculture has helped on in that respect more than many of us know. The membership, I think, we should have doubled—we are lacking in that—in order to help on the work. There seems to be great apathy and indifference. Each member should work to bring in others, and our membership should be doubled. It might be, quite readily and easily, and by that means the Department of Agriculture would be shown the need of giving us greater aid, and it would be forthcoming, and in that way we would all profit.

WAX CRAFT.

By J. L. Byer, Mount Joy.

Beeswax, we know, is a mysterious substance secreted by the bees and not gathered, as our forefathers used to think. We cannot understand the process any more than we can understand how the spider spins his web. Wax is a product from the body of the bee. We find if we look through ancient history and along through the mediæval ages wax was known in a commercial way. Beeswax, I believe, was of much larger production many years ago than now, but modern methods of bee-keeping explain that. Mention of the use of wax in the fine arts was made away back as far as the second or third century. We find also that the ancients had a knowledge of the art of making wax flowers from beeswax; it was rolled out in thin sheets.

Beeswax to-day comes into competition with many other waxes. I think paraffin and ceresin are most largely used for the adulteration of beeswax. While wax is simply a by-product, and does not secure nearly the same attention in production as honey does, yet the great packing houses of Chicago and other places pay their dividends to the stockholders from the by-products, things formerly wasted. I have been impressed with the fact, in the last two or three years especially, as to the enormous waste of beeswax in the country. I would not be capable of making even an estimate of the thousands of dollars of wax wasted in Ontario

every year, without going outside of the Province, and this condition, to say the least, is poor economy. And it is well to remember that while beeswax comes into competition with a number of inferior waxes—I use the term guardedly—it seems to me that the use of beeswax is increasing all the time, and there are calls for beeswax in the last few years in certain lines that in other years I had not the faintest idea it was used for. For the last three years I myself have supplied beeswax to a firm that makes a special line of paper. I know another bee-keeper that is supplying exclusively a firm of engravers with wax for silver plating and work like that, and they are particular as to the kind of wax they get, as to its purity, as to how it is rendered and so on.

The extracted honey producer is more largely interested in the line of wax production than the comb honey producer, because the comb honey producer does not have cappings. The chief sources of wax are cappings and old combs that are filled with drone cells and misshapen and not fit to be left. If you happen to use extracting combs with narrow top bars, you will get a nice little income by scraping those every year. I have seen these same kind of combs used year after year by lots of bee-keepers where they never were cleaned up at all. There are big wages in scraping off those combs, to say nothing of the nicety in handling them for next year's work.

Another source of wax production, which is not so welcome to the most of us, is when we happen to get a dose of foul brood. One man melted up over 5,000 combs, and if it had not been for the wax press it would have been a hard matter to estimate the big loss he would have had, but the wax he received more than paid for all the foundation he needed, and he had about $50 to $75 to the good.

We cannot speak of wax production without coming to the question of how best to secure the most wax, and then we get into the question of wax presses. To get good results in rendering up combs, we must have some kind of wax press. I have had slumgum sent to me different times from different bee-keepers, and while I have not taken the trouble to bring any figures here, I want to say every time when the wax press was used I could make big wages in handling that slumgum which was sent to me, but it is not a nice job. It would run from 25 to 30 per cent. of wax on an average. As to presses, I am not a bit backward in saying I would not have one of the German wax presses if you would give it to me as a gift. Mr. Greiner, of New York, reported that with hard work and good faithful attention you could get about fifteen pounds a day; and if any bee-keeper goes and spends all day for that amount I do not wonder that he would be disgusted with it. With regard to the press Mr. Herschiser has brought out I am not competent to make any remarks, because I have not used it, but my impression is for the ordinary bee-keeper it is a little too bulky and cumbersome. I think Mr. Herschiser will agree with me that we should have some special facilities and special rooms, and if that is so there is no question you will get all the wax, or nearly all of it. The next press after the steam press I used, was the Hatch-Gemmell press, and I might say that that press is still my preference, all things considered. Two years ago, you will remember Mr. Sibbald bringing out an improvement, in his estimation, on the old Hatch-Gemmell press. He went to a lot of trouble and had it here. He got out a model, and it was illustrated in our Annual Report. I have tried the Sibbald wax press, and for some reason I cannot make any headway with it as compared with the old Hatch-Gemmell. The only fault I had with the latter press was in applying the pressure. The pressure was applied in the centre with a screw, without having a cap on it similar to a jack-screw, to hold it steady, and I found the

screw was turning around all the time, and I was bothered sometimes with the follower tipping. I got that rectified, and now it is all right. We found by actual experience in three or four days' test that we could get a very small percentage more of wax with the Sibbald press than with the Hatch-Gemmell, but, on the other hand, the extra work more than counterbalanced that. I only made one test as to what wax we were leaving in the slumgum. Last winter some time we rendered up one afternoon with the Hatch-Gemmell press 127 pounds of wax. More than one-half of it was from old comb, and the balance from scraping the narrow top bars. We saved that slumgum, and while it was still moist the next morning I happened to have a wax press there of the model of Mr. Sibbald's, and I suggested we take this slumgum and see how much wax we could get from it. We worked all day and we got 6¼ pounds of very inferior wax. The question resolves itself with me to this, if we had run that same slumgum through the Hatch-Gemmell we would certainly have got some wax anyway.

As to the purity of wax, Prof. Shutt and others have given us different tests from time to time. Paraffin and ceresin, I believe, are the main adulterants. If the beeswax is pure, and if you take and chew a sample you will find it will all granulate in your mouth. If there is any great amount of paraffin along with it, it will be pasty and act like gum in your mouth. It is a simple test, which I am assured by manufacturers and others will tell if there is any perceptible amount of paraffin with it. Ceresin, I understand, is the main adulterant used in comb foundation. They tell me as good a test as you can make for that—I have never tried it myself—is to take a hot iron and drop a sample of what you know to be pure beeswax on it and notice the smell and colour of the smoke, and then take your suspected sample, and if there is a very small percentage of ceresin in it you can tell it right away, a very fatty pungent smoke will come from it.

In our experience the quality of wax from the hot water press is not as good as from the Hatch-Gemmell. We rendered this 127 pounds and sent a shipment to Mr. Craig, just as it came from the press, and he reported it O.K. I used sap pans and covered them up well and let it cool slowly. Sometimes you will notice cakes of wax will start to check all over the top. That is the fault of cooling too fast. On the other hand we sent some 40 or 50 pounds, which was put through the hot water press twice, and it was spongy at the bottom.

We should be very careful in rendering our beeswax. The only specification the firm that I have supplied for the last three years sent to me was, we want you to guarantee absolutely there has not one drop of sulphuric acid ever come in contact with that wax. They don't object so much to the colour. They use that wax in making a certain grade of paper. I believe the sulphuric acid is sometimes left in the wax and it affects the steel rolls. The same proviso is made with reference to the wax supplied to the Electro Plating Establishment. I believe it is possible to spoil the texture of wax for the fine arts and some lines of work by over heating. You can prove it by a single experiment. Take one lot of wax as soon as the comb is thoroughly melted, and press that out and allow the balance to boil for half an hour or so, and you will find the wax damaged. The Root Company have told me they have come to find that the less sulphuric acid that is used the better. If they are supplying wax for any of the fine arts or any fine manufacture, they too are careful that it has never been subjected to sulphuric acid.

W. A. Chrysler: The principal thing that I wish to speak about is the refining and rendering of wax. With wax properly rendered it would be un-

necessary to be refined with sulphuric acid. I find that any trace of sulphuric acid injures wax. I contend that wax that has been spoiled probably from improper rendering can be refined so that it will be nearly as good as any wax, and will no doubt be accepted by all the trades as no different from the wax that has not been refined with sulphuric acid.

No sulphuric acid should be put into beeswax in its pure state as we buy it; it will burn it; it will carbonate it. When I have to refine beeswax I take a certain amount of sulphuric acid and dilute it with water until there is probably 99 per cent. of water, and then it can be poured into the barrel of wax after it is melted. Don't put it in till after it is all boiled.

Mr. McEvoy: What proportion of sulphuric acid to the amount of wax?

Mr. Chrysler: I have used about half a pint to 200 pounds of dark wax. There is over fifty per cent. of the wax gathered from the beekeepers generally throughout the Province that the supply dealer has to refine to make foundation of. Wax is as particular a thing to melt up as honey. It can be spoiled by overheating the same as in liquefying granulated honey. Of course there is some wax that has been probably put in from dirty receptacles, and it is necessary to get it of a uniform quality in order to make foundation. Wax should be cooled very slowly. When heat is applied to wax or honey or any liquid from below there is a constant agitation. Wax, when left out to cool after it has been melted up, should be covered over thoroughly at the top especially, and the bottom really should cool first. Keep the top warm as long as possible. By keeping a certain heat above the wax while it is in liquid form you could have the impurities precipitated to a certain extent, and you will get very transparent and very nice wax.

With reference to the wax press, Mr. Byer spoke about different presses in use. I might say that the first press I had was from Mr. Gemmell. Mr. Hatch probably "hatched" it, and Mr. Gemmell made one and I bought it from him, and I thought I improved it. I suppose the press I have been using probably might be called the Hatch-Gemmell-Chrysler press, and I have succeeded very well with that. I did sell a great many of them, but I must tell you now I am not in the market for selling wax presses. Mr. Sibbald, I believe, probably made an improvement on it. In fact I made mine to work similar to his, but I find that my own will do just as good work with the amount of labor expended. I tried melting over slumgum last year, and we worked all day, and we get about one pound an hour from the slumgum, and that is the best we could do.

Mr. Byer: A number of bee-keepers wrote me last year in particular asking why they were troubled with such a depth of spongy matter at the bottom of the cakes of wax. I believe the main cause of that is in using hard water. Rain water is always preferable. The lime in hard water acts on the fatty matter wax contains; it is really a form of soap. If you use soft water or rain water you will find it makes a great difference in getting rid of that trouble. I have seen a cake of wax which would probably weigh about 35 pounds, and one-third of that was a spongy mass. I think a great deal of that was caused by using hard water. By allowing old combs to get wet they will deteriorate, and you will get a poor quality of wax.

O. L. Herschiser: When it comes to melted cappings I don't think you will find very much spongy matter in them, but if you are melting old combs that are partly decomposed you will find a good deal of that in the bottom regardless of the kind of water you use.

MR. HOLTERMANN: I have been fairly well satisfied that sponginess is the result of having hot water under the wax. Where the cooling is slow and the steam keeps rising under the wax that I believe is largely instrumental in getting that spongy condition. I do not think you ever find it when you use a solar wax extractor where no water is used.

There were one or two points spoken of there, and one was the bursting of the cheese in pressing out that wax. There are a good many who think that to apply very strong pressure is a great essential in the rendering of wax. I know probably there are quite a number who know it is not the case. I believe in the rendering of wax to get the most out of it one great feature is to tighten up the screw a little at a time and quite often to relax a little. You will find you have the pressure on and there is practically no wax coming from the cheese. When you loosen up a little there will be quite a little flow of wax, so that kind of work should not be done in too great a hurry. The less pressure you apply at the time the less danger of bursting that cheese.

In regard to the melting of old comb, I think it is important not to attempt to melt too much at a time.

We are pretty well agreed that the nicest wax that can be secured is by rendering it by means of the solar wax extractor, and, as in butter making, we know an article which was produced twenty years ago and found a market is to-day practically unmarketable. So I believe in wax craft. We will find from year to year, as we know more about the production of wax, we will have to be more careful as to the method in which it is rendered. I would not be surprised if the day would come when we would heat our wax very largely and melt the old comb even by means of solar heat, and then some method will be devised by means of which we can apply that screw to whatever matter there is and squeeze it out in that way.

JAS. ARMSTRONG: As to this sponginess, could it be brought back to the solid state, the same as the rest of the cake?

MR. BYER: Sometimes I have got the major part of it back, and it was fairly marketable wax.

MR. ARMSTRONG: If you put it in the solar wax extractor won't that settle the whole of that question?

MR. BYER: I have been told so. I have no personal experience.

MR. TIMBERS: Did I understand Mr. Byer to say if the cappings were wet it injured the wax?

MR. BYER: If they are allowed to stand in the water any considerable time. I do not know how long the water would have to stand on them till it spoiled them.

MORLEY PETTIT: There has been a reference made this afternoon by Mr. Byer which shows the importance of careful experimental work, and it touches pretty closely on my work, and that is the reference to the Sibbald press. I have had good success with the Sibbald press. I do not wish to cast any reflections on Mr. Byer's work at all, but it shows how one may go at a thing in a certain way and get good success, and another may go at it slightly differently and miss the point. He may miss the point intended by the inventor. I would be pleased to hear a word from Mr. Sibbald about the management of his press.

MR. SIBBALD: I can take everything Mr. Byer says good-naturedly, because I am not making money out of my press at all, except for the benefit I get in

working it myself. The same gentleman that made his Gemmell press made mine, so there would not be any difference in the start off. However, I have got the Gemmell press in its entirety in my honey house now. I feel sorry for Mr. Byer, because the addition of water around the "cheese" is all the difference there is in the two presses. That hot water retains the heat and leaves the wax on the top and cleans off all the machinery of the press; it leaves all the slats clean and clear of wax, and it is a pleasure to take them out or do anything with them.

The principle of the two presses is the hot water principle as against the principle of putting slumgum in and letting the air cool it all around and fasten it on to everything it touches. The other is far cleaner and more easily done. I have used the same cheese cloths through a whole season and have done 600 pounds. Just by pressing and relaxing a little and pressing again and using your judgment you can work the cheese cloths all you want. You do not need anything stronger. With this press I got up I claim I can get through pretty nearly twice as much work as with the old one, because I use three cheeses instead of one. In the other press you had to put all in one; if you made it very thick you would not get good results. With the three small cheeses you should be able to hold three times as much as you ought to put in the other press. Then you can always use the water once or twice or three times in this press and in the other you would not be able to do that. I believe Mr. Byer gets better results from that press than anybody else I ever heard speak of it.

As to sulphuric acid, I can say my experience is the same as Mr. Byer's. In fact I sell wax, too, and I told the people to whom I sold I could clear that up perhaps a little brighter if I used something; they said, no, we would rather have it that way—we would rather not have sulphuric acid used.

The explanation Mr. Byer made regarding soft and hard water clearing the wax I do not think is quite right. I use hard water because it is handier, and I have used soft water to see if it was any better, and I could not really see any difference. I think that sponginess must come from some other cause.

Mr. Timbers: Did you have very much lime in that water?

Mr. Sibbald: I am not sure about that; it is ordinary hard water; it is a good well, and very good drinking water, and that is all I know about it.

Mr. Timbers: It is the lime that is in the hard water I believe that causes it.

Mr. Sibbald: A press should not hold more than an ordinary boiler full of water and slumgum, that is my opinion. You move it all in from the boiler into the press. In using the combs I just put them in an ordinary boiler and let the water boil in the boiler and shove in the combs. When we take it off we skim the wax and slumgum off the top. We do not try to get much water in cheeses at all. After we have got that all dipped off we pour the water right off the other side and pour it through a strainer, and if there happens to be any pollen or anything in it we will have it caught. This year in clarifying the wax I used a tall can about two and a half feet high, and it would hold about 30 pounds of wax, and the outer can held the water close to it and kept it from cooling. I could put the wax in there from the first melting in the morning and keep on putting it in there until I got 30 or 40 pounds melted, and as it would overflow out of the spout it would always be clarified—all cleaned; the heavy sediment would settle down. I have found that can a great help to me; it saved me re-melting.

Mr. Byer: In regard to these presses. I want to say I do not know that many here have used the two presses. There are very few people that use both kinds of

presses. I admit the principles are the same, and the theory is all right in Mr. Sibbald's press, but hour for hour I can melt more than double in good marketable shape with the Hatch-Gemmell press than with the Sibbald press. With the Hatch-Gemmell press, when we are through melting the wax, we have got it ready for the market except scraping the bottoms of the cakes off. Mr. Homer Burke rendered a lot of wax this summer, and he wrote me, "I have got both presses, and," he says, "one is for sale cheap." You can guess which one he meant.

MR. SIBBALD: I cannot for the life of me see how Mr. Byer can get the wax any cleaner from the Gemmell press than from mine.

MR. BYER: Because it runs from the Hatch-Gemmell press right into the flaring tins, and they are set aside to cool; and with the hot water press you float it over; it does not form a perfect cake.

MR. SIBBALD: The wax floats to the top and the heavy sediment goes to the bottom. You have it separated right straight; you never get that sediment in the cake. With the Hatch-Gemmell the sediment and all comes out together.

MR. MCEVOY: You can all condemn acids as much as you like, but I am going to use a teaspoonful of sulphuric acid. Stir that in. I want about two inches of hot water in the bottom of the pail first, and in an instant it will settle all the sediment and dirt to the bottom. There is no one can produce nicer samples of wax than I do with a little acid, but do not use too much. You can make a nice job with the wax from old combs. You do not need it with cappings.

MR. TIMBERS: When you send that to some man and he comes to test it, and he finds two per cent. of sulphuric acid in it and he sends it back, what do you do?

MR. MCEVOY: In some cases they won't use it, such as for piano polishing, but I will use a little acid, and I will get more for my wax as a rule.

MR. LOWEY: In any wax I have used I have always strained it. As soon as the wax is melted take it off and cover it up. If there is any sediment it is on the bottom, but there is no sponginess. I do not think the water makes any difference. I never found sponginess from the water. I have had the water so warm that 24 hours afterwards you could not put your hand in it.

MR. HOLTERMANN: I have never yet succeeded the first time with a Hatch-Gemmell wax press in getting a cake that is fit for the market. If there is any one can do it I would like to hear how it is done.

MR. NEWTON: I do not believe in all that has been said: that is natural, I suppose. Mr. McEvoy rose to say he did not believe but what supply men and foundation makers used a certain percentage of acids in cleansing dirty wax. I can say I have made foundation for at least twelve to fifteen years and I have not yet seen a bit of acid on my place. I do not think it is necessary to use it. I believe in the first place we lose a considerable amount of wax in the use of acids. I believe the capping wax myself is too hard to make No. 1 foundation, but I believe in a little blending which will help matters out for bee-keepers and for the bees also.

MR. MCEVOY: I cannot agree with Mr. Newton in the blending of wax. When I send nice white wax I want that back.

MR. NEWTON: Mr. McEvoy never got blended wax back from me; he got just what he sent. But, with lots of wax that comes in, if I had my way of doing it, I would prefer blending, and you would get nicer foundations, and it would be taken more readily by the bees.

MR. TIMBERS: Which can you make the best foundation from, a bright, soft, yellow wax or a hard wax from cappings?

MR. NEWTON: I can tell you which is the hardest to make. I do not know that there is practically very much difference except in the work. Capping wax is certainly harder to make. More pressure is accordingly needed to do it. I do not know that one can make any nicer foundation from one than the other. It has been harder work to make foundation the last few years than ever before.

MR. TIMBERS: Will hard wax make a more brittle foundation?

MR. NEWTON: Sure.

QUESTION DRAWER.

Q.—*What is a colony of bees worth?*

MR. BYER: For a colony in good condition in the spring you would ask about five or six dollars.

MR. CHRYSLER: I believe a colony of bees is worth an acre of land.

MR. LOWEY: In my vicinity there were 30 colonies of bees sold, and they got a dollar a colony. It makes a difference whether those who own them read our literature and attend our Conventions. They asked me what they were worth, and I told them at least $5.

Q.—*When do you clip your queens' wings?*

MR. TIMBERS: I always clip mine just before fruit bloom. In the last two years I have not clipped queens at all except on the run. I like that way best.

Q.—*Does it pay to re-queen every year?*

MR. PETTIT: So much depends on circumstances. I think that a queen should not go through more than two seasons, and if we have two seasons in one year, one year is as long as we should keep her. That is, if we have a white honey season and a dark honey season following it. If we only had the white honey season I would not object to keeping her the second year, but not longer that that under any circumstances except for special breeding purposes.

Q.—*Is the huckleberry bloom a honey plant?*

MR. HERSCHISER: There is a bee-keeper down in Cape Cod, Mr. Allen Latham, who has his bees in a poor locality, and I guess he is a pretty good bee-keeper, and I saw some reference to his honey resources, and among them was mentioned the huckleberry. I have wondered whether the huckleberry might not be a pretty good flower for the production of honey, the same as the raspberry is in other localities. I have a few bees not very far from a large huckleberry marsh, and last spring while my bees were already building up as the result of spring dwindling, another bee-keeper that lived only six or eight miles from me, and apparently subjected to the same winter conditions, had his bees swarming and gathering white honey, and they were right adjacent to a huckleberry marsh. This huckleberry marsh has what they call the high and low berry bush. The low bush is not much higher than the strawberry plant, and there are bushes considerably higher than a man's head. They were all swamp huckleberries.

Q.—*What is the best way to feed for winter, and is it too late to feed now?*

MR. CHRYSLER: Yes, too late excepting you put in full combs of sealed honey. In cases where it has been unavoidably left over, candy made from granulated sugar in cakes put over the frames will answer. I always let the syrup boil till it

gets to a certain consistency, and stirring it or probably mixing a small quantity of honey in it and pouring it in pans about eight by twelve inches, and an inch to an inch and a half in depth, and caking it in them and then putting it over the frames. It is difficult at this time of the year to get bees to take syrup that is thick enough. Of course it may be done. One aid to that would be to have the bees well packed and warm, and if mild weather comes they will take it down in cases where they would not otherwise.

Mr. Timbers: Won't they take it up a great deal more in colder weather than they will take it down?

Mr. Pettit: There is a method that I have seen practiced this fall that is very successful, and by means of which I think bees will take feed real late. Take a two-quart sealer and get a disk of perforated tin with very fine perforations, and put that in place of the glass on top of the sealer, and have holes in the top of the honey board that will just fit this sealer top. Turn your sealer upside down over that so that the bees can feed through the perforated top. The holes are so small the syrup will not run out, and the pressure of the air holds it in the jar. The bees can suck it down with their tongues through the openings, and they do not need to leave the cluster at all. If the bees are in packing cases I do not know how late they can take it, but I know of a yard that is being fed this week quite successfully in this way.

Mr. Herschiser: I have done considerable feeding in one or two seasons in the manner described by Mr. Pettit, both outdoors and in the cellar, and they will take the feed right along. They get the feed so near to them they do not need to break the cluster. I do not use perforated tin. I use a piece of cheesecloth and screw the rim down over that.

Mr. Eyre: One thickness of cheesecloth?

Mr. Herschiser: That is sufficient. If the mouth of the jar is very large it might not be sufficient. You can experiment with water to find out.

Mr. McEvoy: When the weather continues favourable it is no great trick to feed. I always like to have everything fed up complete by the 15th September, but some twenty odd years ago I set a crate under a tin pan filled with straw. It came up very close to the frame, and I put in the feed in the night when there was a white frost, and these frames were within about three eighths of an inch of the syrup, and it would surprise you what they would take up in a night. You can feed up a hive now in first-rate shape by putting the feed in hot.

Alex. Dickson: I have been feeding less or more for the last twenty-seven years, and I have tried every plan. One of my neighbours came to me one day and threw down rather a rough looking box and said: "What do you think of that?" He told me it was a feeder. I have tried it the last three years, and I experimented two years ago to see how late I could feed. I fed twenty pounds with the temperature down to eight degrees. I lined the box with a slatted float, and the bees will take up the feed in a hurry. There is no better feeder. I have had them take up 25 pounds in one night, but, as Mr. McEvoy says, feed before the end of September. I place the feeder in the bottom of the cluster. If you line them with tin you must paint the tin because the surface is too slippery.

H. E. Eyre: I tried to feed a swarm I had about four weeks ago, and they would not have anything to do with it. I tried it about ten days ago, and they took it down, lots of it. I thought perhaps they might have had some of their comb occupied with brood and had not room for it, and after they got through they were willing to do something with it.

MR. ARMSTRONG: Nearly every bee-keeper here I suppose has got a five or ten pound tin. He can perforate the cover of that and make as good a feeder as he needs. Turn it upside down over an opening at the top, and you can feed the bees at any time. Feed it warm. You do not want to get your sugar so that it will candy. I have had them take down in just such weather as you have got to-day sixteen pounds in fourteen hours. The syrup I have been using for a number of years is two to one by weight.

MR. BYER: I want to call attention to the fact that it is extremely unwise and risky to leave off feeding till this time of the year. Different locations and different honey flows make a difference. I finished up feeding this year about the 16th October.

Q.—*Which is the best race of bees?*

MR. MCEVOY: The Italians, decidedly.

Q.—*Don't you think the presence of honey in wax causes a spongy condition?*

MR. BYER: Yes, it will.

MR. HERSCHISER: A great many of you have melted up cappings that had considerable honey in them, and when the wax comes to cool you find a nice solid cake of wax without any spongy condition.

MR. BYER: It is a different thing with combs full of honey. In cases of foul brood I have seen where they had a whole lot of honey, and I have yet to see the first case where they did not have spongy cakes.

MR. HERSCHISER: I would not attribute the sponginess to the presence of honey.

MR. LOWEY: After I have taken the wax off I have had the water taste and look and smell like syrup, but no sign of sponginess about the wax.

Q.—*What will be the effect of honey-dew on wintering?*

THE PRESIDENT: Sure death.

MR. HERSCHISER: I have a couple of yards of bees that have considerable honey-dew in them that I expect to winter pretty well, and the reason I expect it is because the honey-dew is on the outside combs of the hive. They were quite full of brood at the time the honey-dew was gathered. Since the honey-dew was gathered there has been quite a quantity of buckwheat and aster and golden rod honey put in, and I notice that some advise the feeding of sugar to fill the centre of the brood nest with a food that the bees will eat before they get to the honey-dew, and I think that condition is met where the bees have gathered buckwheat or other good wintering honey and left the honey-dew on the outside where it will be used last, towards spring.

MR. ATKINSON: How do you know it is honey-dew?

MR. HERSCHISER: I know by the description, and by the fact that in the season when I should have been getting white clover honey and basswood I did not get it. It was a smoky colour, with a slightly unpleasant taste. I do not know whether it is honey-dew or not, but I have every reason to believe it is.

MR. ATKINSON: How are you sure you have not got honey-dew in the dark buckwheat?

MR. HERSCHISER: I have read somewhere that there is no honey-dew gathered after late in June.

MR. ATKINSON: My experience here is that in a season where it is coming in it seems to come in more or less the whole season through. We have had an experience in our section something the same as Mr. Herschiser did with this honey-dew. Three years ago we got quite a crop, and in colour it was dark, and quite

thick in body like blackstrap. I was out to the bush when I heard the bees hum, and found they were working on the inside of the leaves, and wherever you would see them working there were insects there, and that is the kind of honey Mr. Herschiser got.

MR. HERSCHISER: That is what I call honey-dew.

A MEMBER: Would it not be a little bit easier than to attempt to extract from the brood nest at this time, to fill the central portion of the brood nest from which the bees have recently hatched, with a good thick syrup made of two to one, then they would live through the winter on this thick syrup put into the place where they could get it easier and not get the bad stuff till they were getting flights in the spring, when they would be perfectly safe?

MR. MCEVOY: I would get that stuff out of the hive.

MR. HERSCHISER: I am not going to extract mine or feed them; they are pretty heavy, and I will be able to tell you in about a year from now whether Mr. McEvoy is right.

MR. TIMBERS: I would take out combs from the centre and feed them from underneath.

MR. ATKINSON: What is the taste of honey-dew if it is pure?

MR. TIMBERS: It tastes a good deal like scorched syrup.

Q.—*Did any bee-keeper ever winter on beet sugar syrup? If so, kindly state results.*

A MEMBER: I went in on it last year, and the bees wintered well; it was Wallaceburg beet sugar.

MR. STORER: I think you want a good deal more beet sugar to the weight than of cane sugar.

Q.—*How can this Association be made more profitable?*

MR. MILLER: I think through the affiliated societies. The effort is being made there, and I think it has resulted in good. There are many ways that might be suggested. Through discussion there may be something brought out.

MR. HERSCHISER: Mr. President, I think the thing that will appeal to bee-keepers and get them to join an association more than anything else is to get them to feel that the association is doing them some good. That will make the Association profitable.

THE PRESIDENT: How can you make them believe it is doing good?

MR. HERSCHISER: By argument. I think the Crop Committee of this Association is the thing that will do the Association more good than anything else, if you can get the Association to stand by it. When the Committee have made a report and then various members of the Association begin to try to bear the prices down, it does not result in any good to them. Every bee-keeper should make the price which the Honey Committee fixes his price. How can you get them to do that? Just as soon as a bee-keeper makes an offer of honey at the price he thinks it ought to bring, then the buyer begins to enquire around amongst the bee-keepers, and if he can get the seller to cut down the price, then that causes a break right away. I have thought an association could do a great deal of good for its members if the Crop Committee could resolve itself into a sort of information

bureau to recommend to large users of honey the honey of members of the Association, and get them to purchase at the prices that the Committee recommends.

Q.—*What is the best way to treat old combs containing dead bees and pollen? We have known some to place them in tubs of water and then shake or jar out the bees.*

Mr. Timbers: The pollen can easily be soaked and gotten out. You do not need to bother about the dead bees; the bees will clean them out themselves.

Q.—*Is the tough dark substance or sediment under cakes of wax of any value?*

Mr. Herschiser: The way I treat this tough dark substance and all other substances that I scrape off the bottom of the cakes of wax is to keep accumulating it till I get quite a lot of it, then melt it up and get quite a bit of wax out of it.

With reference to the use of sulphuric acid, there is quite a strong feeling among a good many bee-keepers against its use, and I know there are some that use it and with success, and I am one of that number. I have probably had as much experience in rendering up old combs and slumgum as any other bee-keeper. I take a batch of wax, five gallons and a dessert spoonful of raw sulphuric acid without any diluting. I have two or three inches of water in the pan, and I put the acid right in the melted wax and begin stirring, and stir for two or three minutes, and it will bring out the colour and make it nice and bright. Sulphuric acid is very sour, and if there is any taste in the wax you can easily detect it by chewing a little of the wax, and unless you use a lot of it you won't find any taste in it; it goes into the water. The capping wax I do not treat with acid, only the dark coloured wax. I sell a good deal to foundation makers; and I remember one time the Root Company's representatives stopped at my place, and I had about 1,100 pounds of wax, and the most of it I had treated with acid. I shipped it to them at the highest price and they wanted more. If properly treated, sulphuric acid will not injure the wax, but make it better. I have sold a good deal of wax to concerns that use it for silver plating, and never had any complaint about it.

Q.—*After scraping the section frames and hives can good clear wax, free from propolis, be obtained from the scrapings?*

Mr. Armstrong: I would say yes.

F. P. Adams: I have never had much experience in putting through clear propolis, but propolis mixed with slumgum and old combs seems to separate very nicely.

Mr. Herschiser: Nearly all propolis and scrapings from sections and frames contains a good deal of wax, and you can get just as nice wax out of it as you can from pure cappings. The propolis is much heavier than wax, and it will separate, and is about 40 or 50 per cent. pure wax. This propolis is a good deal like so much varnish, it will go to the bottom, and be in little shiny particles and collect in the bottom of the can.

Mr. Timbers: My wife fills the boiler three parts full of water, and then lets the wax stand in the water to cool, and the propolis goes to the bottom in a chunk, and the wax is clear on top.

Mr. George Henry, Oriole, Warden of the County of York, then gave a hearty address of welcome to the Convention, in which he paid a tribute to the importance of the honey industry.

The President thanked Warden Henry for his kind welcome.

REPORT OF HONEY CROP COMMITTEE.

Toronto, August 3rd, 1909.

The Honey Exchange Committee of the Ontario Beekeepers' Association met at the Secretary's office in Toronto to-day. Reports were received from a large number of points throughout the Province, covering about 15,000 colonies, and the Committee were enabled to get accurate figures for comparison with previous years.

It was found that the average production per colony the present season was 59 lbs. as against 55 last year. The honey is of much better quality throughout, and a greater consumption may be looked for. All old honey is practically cleared up both here and in other Provinces. With a light crop only in the United States, and a greater demand in the West due to this fact and also to a good harvest, much more Ontario honey should find a market there at reasonable prices both to producer and consumer.

The lower prices of fruit in Ontario due to large crops and the slight increase in production of honey mentioned above warrant the Committee in recommending a reduction in the prices both for extracted and comb to the following:

No. 1 Light Extracted (wholesale), 9½c. to 10½c. per lb.
No. 1 Light Extracted (retail) 12½c. per lb.
No. 1 Comb (wholesale) $1.80 to $2.25 per dozen.
No. 2 Comb (wholesale) $1.50 to $1.75 per dozen.

The Committee would suggest to the bee-keepers to retain a portion of their crop until later in the season, so as to more equitably distribute the honey throughout the season and supply the later demand which will ensue as a result of the splendid quality of this year's crop.

September, 8th, 1909.

The Committee met at the Exhibition Grounds this afternoon and examined the reports as received to date in respect to the buckwheat honey crop and prices received for white honey. The crop of dark honey is good but the Committee find that the markets are clear of last year's crop and buying freely already. The following prices for dark honey are advised:

Wholesale 6 to 6½c. per lb.
Retail 7½ to 8½c. per lb.

A number of the largest producers have already sold at these figures.

In regard to white honey, the Committee find that the prices sent out in their previous report are being fully realized, and think that those still holding part of their crop should receive these prices without difficulty. Practically everything has been sold at from 10c. to 11c. Peel and Halton report most of light honey disposed of, much of it going to the Northwest.

Mr. Sibbald: The Crop Committee met this year about the 4th of August, and found more reports from the bee-keepers than ever before. That goes to show that the bee-keepers are appreciating the work and have confidence in the Committee and have taken the trouble to send in their report cards filled out; and of course you all know the more reports we get the more accurately we can figure out what the crop is. Taking that in connection with other conditions it helps us a great deal to arrive at a right and proper price. Some people say we are too

late and some say we are too early in holding our meeting. I hardly know how we could do differently, because in the warmer parts of the Province it is earlier than it is north, and while they know a week or two ahead what their crop is, the other fellows can only guess at it. We try each year to size it up and let the Secretary know when we think it would be wise to send out the cards.

The fall report this year we made at Exhibition time and looked over the cards and found that buckwheat honey is showing an increase in the Province each year. I think the acreage of buckwheat will greatly increase. It is a profitable crop. That is the decision people come to wherever they grow it.

We got from a number of bee-keepers this year an estimate of what honey they would have to sell in a wholesale way, and our Secretary sent that to a number of firms that were enquiring for honey, giving the price, and I think he gave the number of pounds these people had. I for one object to that, and I intended to mention it to the Secretary. I do not think he ought to send the number of pounds that anybody has for sale. It will be enough to give the dealers the names of those having honey for sale and let them correspond, because the dealers make use of all these things in a way we do not intend.

Then we mentioned honey being in demand in the West this year, and some have criticized us for that and thought we drew too much attention to the West. The reason we did that was to make the bee-keepers feel a little more confident, because we thought there would be a large demand for honey in the West, and we wanted to let the people know where the honey would be likely to go so that they would not feel like taking a lower price. There was a feeling that honey would come down this year, and we could not see any very good reason why it should be much lower. The market was bare, and when you find a bare market it takes a large production to over-stock it. That has been my experience. I do not know whether our Committee on Transportation could get any better rates to the West or not; if they could it would help wonderfully; and then there is a north country opening up in the mining districts, and a tremendous lot of honey this year going north; and if we could get better freight rates north it would help.

I have heard this year great praise for that corrugated package that they are getting out for shipping comb honey. One dealer in the city told me he had sent a lot of honey to Cobalt, and it went perfectly safe, and it might be well for the bee-keepers to look up that package for comb honey and see how it would suit. It has been a great drawback to comb honey that we could not ship it without quite a bit of loss and danger.

J. D. Evans, Islington: I do not think the freight rate on honey to the West and Manitoba is unreasonable. I have shipped honey out there at a cost of two cents a pound for liquid honey, but the express rates on liquid or candied honey in Ontario are enormous. I sent a 25 pound can down to Ottawa to my son by express, and it cost me 75 cents. I do not know anything about the rates on comb honey.

Mr. Sibbald: The rate on comb honey is first class, and if we could get a package that would carry comb honey, very well—this corrugated package might do that—then perhaps we might approach them, and get second class rates on comb honey, and that would help the comb honey situation.

A short discussion then ensued with reference to whether it was advisable for the Committee or the Secretary to give to dealers particulars of the amount of honey that bee-keepers had for sale. The feeling of the majority was that it was unwise to do this, while some thought it was a good thing as it enabled the dealer

to know where he could get a large amount of honey if he desired to do so, without first going to the small bee-keeper and finding he had not a sufficient amount to supply him.

All who spoke were unanimous in their praise of the work of the Secretary and Committee. The discussion was participated in by Messrs. Chrysler, Timbers, McEvoy, Dickson, Grainger, Adams, Holtermann, Lowey, Byer, Herschiser, Holmes, Evans, and Galbraith, after which Mr. McEvoy moved, seconded by Mr. Evans, that the Crop Report Committee do not hereafter send out to dealers the quantities of honey that bee-keepers hold. Carried.

SOME FEATURES OF MY YEAR'S WORK.

By Morley Pettit, Provincial Apiarist, Jordan Harbour.

The Provincial Apiarist was appointed by the Ontario Department of Agriculture to promote the interests of the bee keeping industry in the Province of Ontario. His duties began April 1st of the present year, part of each week to be spent in experimental work and part in the inspection of apiaries and in lecturing in Apiculture at the Ontario Agricultural College, Guelph.

His first duty was to secure bees for the Experimental Apiary which was to be established at the Horticultural Experiment Station, Jordan Harbour. The points to be considered in selecting colonies of bees for this work had reference to the general conditions of the bees and hives. The hives should be of standard make, preferably Langstroth, with straight combs. The bees should be pure bred Italian, free from disease, and in good condition as to queen and strength of colony. After considerable correspondence, twenty-five colonies of pure bred Italian bees in ten frame Langstroth hives with twenty-five extracting supers, containing new wired combs, also a number of comb honey supers, were purchased from Mr. F. P. Adams, Brantford. As Mr. Adams had wintered his bees out of doors, and as their strength was considerably reduced by the exceptionally late spring, it was thought advisable not to unpack them for moving until settled warm weather, about the 1st of June. At that time they were moved to the Experimental Station, and worked for extracted honey and increase. The confusion of getting the bees moved and settled, getting the building up, and other things in shape left very little time for experimental work.

A start was made, however, by finding out what had already been done at experiment stations to avoid needlessly going over ground that had been fully covered. For this purpose a circular letter was sent to all the Agricultural Experiment Stations in Canada and the United States Most of these report that they are doing nothing with bees. A few had done some work with bees years ago, but had dropped it through pressure of other things. The Central Experimental Farm at Ottawa did some work under the direction of Mr. John Fixter, on which he has reported to this Association at former Conventions.

The Michigan Experiment Station reports that a large amount of work had been done from 1870 to 1894. Since that time practically nothing has been done and the Institution has not been keeping a stock of bees for about ten years.

The Kentucky Agricultural Experiment Station reports that they have been experimenting with two varieties of bees, the Cyprians and the Carnolian, for some years, but have published nothing in the form of a bulletin.

Mr. G. M. Bentley, Assistant State Entomologist, Knoxville, Tenn., writes as follows: "We have kept bees at the University Farm for the past three years. Our main purpose has been to determine which honey bee would do best in this locality, and the amount of attention necessary to give bees in order to get the best returns. We have been handicapped in the work by lack of means and time to devote to this kind of work. The apiary has been successful, and has been the means of creating a great deal of interest in bee-keeping throughout the State."

At the Maryland Agricultural College the State Entomologist has done some work on the subject, and is trying to determine the benefit of bees in pollenization of fruits and other crops.

Mr. E. E. Scholl, Assistant in Charge of Apiculture at Texas Agricultural College, writes as follows: "The work under way at the College Apiary at the present time consists of the following: A study of the bee diseases of the State, conducted by Louis H. Scholl, District Foul Brood Inspector. A study of honey-yielding plants in different localities. This is done principally by our travelling assistants. The production of honey vinegar from the poorer grades of honey and washings. The method used is that followed out in Arizona by Prof. Vincent. Comparing the different strains of bees as to the best honey gatherers is another line of work. The study of the value of concrete bottoms in localities where the wooden bottom boards will not withstand moisture and other conditions. The planting of various honey plants to determine the value of such plants in a barren locality. We have tried Buckwheat, Rocky Mountain Bee Plant, Cow Peas and Sweet Clover. They have all proven successful. Besides we have made tests of bottling honey at different temperatures to determine the exact temperature at which the honey will keep from granulating. These are some of the experiments we are trying now. I will give you the results at a later date."

Several of the States have issued bulletins on the status of Bee-Keeping and bee diseases; but by far the most extensive work is being done by E. F. Phillips, Ph.D., in charge of Apiculture, United States Department of Agriculture, Washington, D.C. In reply to the circular letter Dr. Phillips sends a six-page letter out-lining his work from which the following has been condensed:

Dear Mr. Pettit.—I am very glad to hear that a new Experimental Apiary is to be established by the Ontario Government and I congratulate you on your appointment as Superintendent. I may say first of all, that I shall be very glad to co-operate with you in every way possible, and if I can help you any it will be a pleasure. It will be an advantage to both of us if we can co-operate in the work.

To give you an outline of our work is something of a task, but I shall summarize the various projects from my last Annual Report and add explamatory remarks as they present themselves.

Bee Disease Investigation. The causes of the two contagious diseases have been studied and it has been definitely established that *Bacillus larvae* is the cause of American foul brood. The cause of European foul brood is not known, but various microörganisms found in brood dead of this cause have been studied. We expect to continue this work and this summer particularly to study the distribution of the diseases in the United States. A bulletin is in preparation giving a summary of the work in bacteriology that has been done here and elsewhere. Last summer extensive experiments in treatment were carried on and this will be continued this season.

The object is to find the cheapest method of successful treatment, and if shaking proves to be the only effectual method, then to find the most effectual time and method of shaking. The results so far are very significant.

Races of Bees. The Bureau formerly distributed queens of various races of bees. This has been discontinued and I do not believe that the work is at all valuable. We keep on hand lists of breeders of various races and in case of inquiry give the names of at least four nearest the applicant. No partiality is shown any breeder.

Honey Analysis. In co-operation with the Bureau of Chemistry we are having analysis of honey made and, this is now being done on honeys imported into the United States.

Wax Analysis. The same thing is just being begun with wax. Market conditions are also being studied as well as wax production, uses of wax, etc.

Activity of a Colony. Last year we had a hive on scales for an entire year with weighings every hour during the day and all night for three days a month. Readings were also made of five thermometers inside the hive, one at the entrance (inside) and one outside. The results are now being tabulated. It is remarkable what all can be gathered from such data.

Study of the Status of Bee-keeping. I enclose some blanks which were used in gathering and tabulating reports of bee-keepers. Our work in Massachusetts is now in press and similar work is being done in Maryland, Pennsylvania and Virginia. This is the means of sending out great quantities of our literature and locates lots of diseases. It also enables us to find out the conditions of bee-keeping quite well. The labour of this work is enormous.

Anatomy. The anatomy of the bee has never been described in a satisfactory manner, and the books in common use are full of errors. We expect soon to publish an extensive bulletin on this subject, illustrated by about one hundred drawings made from the bee and not copied from some other book.

Embryology. The development of the bee is very imperfectly understood, and seems to me to be of great importance. For this reason this is being studied by a man thoroughly trained in his work.

Behaviour. It has long seemed to me that the greatest need of the practical bee-keepers was a more intimate knowledge of the behaviour of bees. Too many of them work by rules that some one else has laid down. Too many of our manipulations are not fully understood. We propose, therefore, to make a very detailed study of bee activity and shall try to find out the basic outlines of bee behaviour.

Bibliography. The literature on bees and bee-keeping is so extensive that it is very difficult to cover the ground. To aid in our work here we are making a bibliography by books and papers on this subject. This has been going on for about a year and a half and we now have at least 15,000 titles arranged according to authors and subjects.

Translations. When an article in a foreign language is important, and will be needed frequently for reference it is translated, copied and filed.

There is so much to do that we welcome help from Canada."

Truly yours,

E. F. Phillips.

Work along some of these lines has been begun by the Ontario Provincial Apiarist, and as the equipment grows some really valuable results can be obtained for the benefit of Ontario Bee-keepers.

Two hives of bees were placed in the windows of the office at the Experiment Station with flight opening through the window sash, one small colony in a Root observation hive and the other a good average colony in a ten-frame Langstroth hive placed on scales and weighed morning, noon and night for about two months beginning the 24th of June.

These weights have been tabulated in parallel columns with morning and evening weather report of the Experiment Station. A series of such record covering a term of years would give some idea of the influence of weather conditions on the working of bees and the nectar secretion of blossoms. Of course no definite conclusions can be drawn from the records of one season. It might be said in a general way that the greatest daily increase of weight was 13½ pounds on June 28th. The day was fine and clear with south breeze and a temperature rising from 61 degrees to 81 degrees during the day and dropping to 60 during the next night.

On the night of July 2nd, a thunder storm followed by strong N. wind and a fall of temperature to 56 degrees on the 3rd. cut off the honey flow so it was only spasmodic until it dropped to practically nothing after the 9th of the month. The eight days preceding July 2nd gave an increase in weight of eighty pounds.

Another feature of these results is the fact that the morning weight was always less than that of the night before. This might be ascribed to the evaporation of

nectar; but the loss in weight was not found to be in proportion to the previous day's gain, in fact it continued to range between one and two pounds nightly until the night's loss was greater than the previous day's gain, and the hive was found to be weighing less from day to day.

Comb Building. It is of practical interest to bee-keepers to know how much wax from the foundation is built in the cell walls of the comb. To test this, five pounds of medium brood foundation were secured from Messrs. Ham & Nott which they had coloured black with a vegetable dye. It was placed in wired frames and given to the bees, some in extracting supers and some in brood chambers. The results varied according to the strength of the colony and the honey flow. In some cases the resultant comb was coloured clear to the ends of the cells. In others it was shaded off to white at the outer ends of the cells. Apparently about one-half of the cell walls was composed of the original foundation wax.

Testing Appliances. In comb honey production, samples of the following were received: The Bachmann Comb Honey Super, The Crane Cellular Paper Shipping Case, The Wire Cloth Separator, but owing to pressure of other duties no comb honey was produced this season and these could not be tested.

In extracted honey production the wire queen excluder, manufactured by the A. I. Root Co., was found very satisfactory and an improvement on the old style perforated metal.

An uncapping knife received from Mr. W. A. Chrysler, Chatham, is a decided improvement on the bevelled knife with offset handle in common use. It is nothing but a straight handled carving knife with blade about twelve inches long and an inch and a quarter wide. This will reach clear across a Langstroth comb with handle clear to uncap with one strong stroke. The blade should be very stiff and not too wide.

Uncapping Machines. An effort is being made to secure samples of uncapping machines, but so far the correspondence has been one of hopes deferred. The Canadian machine, invented by Mr. William Bayless, of Brantford, is not being manufactured for sale.

Mr. A. C. Miller, who has extensively advertised a decapper, promised one of his machines to the Experiment Station early in the season, but so far the correspondence has ended in promises. The other inventors in the United States were corresponded with, but were too busy to make machines for use in Canada at present.

Capping Melter. Two machines were tested. One made by Mr. Behune, of Australia, and the other by the A. I. Root Co. The former consists of square tin steam pipes placed horizontally with their corners together, one-eighth inch apart, on which the cappings are placed. When melted the liquid is expected to pass down through these ⅛" spaces into separating pen which is kept warm. The other machine is built on the double boiler principle with outlet through coarse and fine wire cloth strainer for the wax and honey you run off as fast as liquefied. The rendering of wax and honey from cappings is a difficult matter.

The problem is to separate them in a practical way without injuring either. The only known method is to apply heat until both are sufficiently melted to separate by gravity.

The simplest device for this purpose is the solar wax extractor. It separates the wax and honey most successfully, but it injures both the colour and flavour of the honey.

It is also rather slow on account of the uncertainty of sunshine, and requires attention at a time when other apicultural work presses the heaviest. Another method which has not the latter objection is to drain the cappings well and pack away in barrels till winter, then wash out the honey with water and melt down the wax into a cake. The objection to this is that the honey either is lost or must be made into vinegar. The latter is a line by itself into which most apiarists do not care to go.

It is most desirable to save both honey and wax in their commercial form uninjured. Honey is injured by heat in proportion to the number of degrees of temperature and the length of time heat is applied. Hence the question is to devise mechanical means for getting the liquified mixture away into the separating pan as quickly as possible. The obstacle in the way of accomplishing this easily is the refuse matter always contained in the cappings. If all would melt it would be comparatively easy to draw off the liquid as fast as it forms. The Behune melter, for example, would answer the purpose nicely, but as it is, the spaces between the steam pipes soon clog with refuse, which tends to hold back the liquid until the honey is injured. The same difficulty is found with the Root melter. The strainer soon clogs. Another great trouble with the latter is the comparatively small melting surface and the very small outlet. The great mass of cappings does not touch the heat, and the liquid that forms is held back from the outlet by what is yet unmelted. Further the outlet is into cold air which can come in and cool the whole strainer.

For melting cappings in bulk the Root capping melter is perhaps the best that has been brought before the public as yet. Still it will be greatly improved when these objections can be overcome. To use it according to instructions as an uncapping can with a heated oil stove in the extracting room is not pleasant in hot weather. In fact many would not use it for this reason except on real cool days. This work will be continued with the hope of discovering some practical method of separating the honey and wax without injury to either.

Returns from the Apiary. The 25 colonies with which the season opened were increased to 38. The honey crop amounted to 1,750 pounds of extracted honey, all of which except about 100 pounds is white clover and alsike. About 200 new combs were built on wired foundation.

Expenditure. About $780 have been spent for bees and equipment at the Experimental Apiary.

Races of Bees. The Inspector on his rounds is asked every day where good queens can be secured. The Inspector is not supposed to be an advertising medium yet he should be able to give expert advice in all such things. The Provincial Apiarist has received queens from two different Canadian queen breeders and introduced them to nuclei. In another year he will be able to report on their merits.

Problems to be Worked Out. The greatest problems which confront the practical bee-keeper are wintering, spring management and swarm control. Another question which has been taking a prominent place in the *Bee Journal* during the past season is one which is worthy of consideration, and that is "What conditions affect the working of colonies of normal strength?"

Some of the conditions are:—(1) The race of bees. (2) The strain of bees. (3) Numerical strength of colonies. (4) The age of working bees. (5) The age of the queen. (By age of queen we mean the amount of egg laying she has done.) (6) Nervous condition of bees. (7) Honey bearing flora of the neighbourhood. (8) Weather conditions.

There are many others which only patient observation and experiment will discover. These lines of work will be taken up as rapidly as time and equipment will permit.

The Library. The nucleus has been formed of a library of bee literature with all the standard works on the subject and complete files of all the magazines published in the English language. These are in process of collection, and the leading articles are being indexed. Besides the magazines published in English a number of standard French magazines are being received. As some of these files are incomplete in back numbers, contributions by members of this association or others would be greatly appreciated. It is proposed to continue the work of collecting and indexing until the Provincial library of apiculture is made most complete.

Status of Beekeeping. A great deal of assistance can be rendered the bee-keepers of the Province if their names and addresses are known to the department. The Provincial Apiarist is making it a part of his work to compile a card index of all the bee-keepers of the Province with the name of their post office, township, and county, with the number of colonies of bees kept and any other information of value. These cards are in duplicate. One set is indexed according to the names of bee-keepers and the other according to counties and townships.

There is a movement on foot in the Department of Agriculture to transfer the experimental apiary to the Ontario Agricultural College, Guelph, leaving a commercial apiary at the Horticultural Experiment Station, Jordan Harbour, centralizing the provincial work in apiculture where the other agricultural work is centralized and where the students are.

Work at Ontario Agricultural College. It is one of the duties of the Provincial Apiarist to deliver a course of lectures in apiculture to the students of the O. A. C. At present this is confined to two lectures per week to the first year class during the fall term. This class is composed of men of all nationalities and degrees of educational training up to college and university graduates. Most of them know nothing of bees. The majority do not expect to engage in bee-keeping. Yet no agricultural education is complete without some knowledge of the habits and management of these most useful insects. As this is the only work in the subject the students get in their whole course it is necessary to decide carefully what phase of the subject which can be presented in a short lecture course will be of most value to them. The following plan was decided on:

First the attention of the class was secured by showing the practical value of the subject in hand. Bee-keeping is one of the most pleasant, healthful and profitable of all lines of agriculture. Pleasant because of the mysteries and problems of the teeming insect population of the hive with their varied interests and ambitions, because duties connected with it are mostly out of doors in pleasant weather and indoors when the weather is bad, because it is mostly clean light work. It is healthful for the same reasons and because the product is the purest and most wholesome of sweets. The greatest value of bees is without doubt the fertilization of fruit and seed blossoms. Also the apiarist with the expenditure of some labor and considerable experience receives for his cash investment dividends of from 50 to 75 per cent. On the other hand, a large percentage of those engaged in bee-keeping fail for lack of experience and good management. This can be overcome only by thorough education and training in the subject. These young men who have given their labor in the apiaries of successful bee-keepers, sometimes even paying their own board, have found it most profitable to them in after

years, when managing their own apiaries, as some of the members of this Association can testify. It is now fully time that an opportunity for such instruction and experience should be given the students of the O.A.C. A four year course in apiculture with the right man in charge and fully equipped apiaries, laboratory, class-room, winter repositories, etc., etc., would put men in the way of becoming successful apiarists, assistants, and foremen in apiaries, inspectors of apiaries, queen breeders, instructors, experimentalists and experts in all lines of Apiculture.

After showing some of the advantages, the attention of the class was called to some of the difficulties of practical apiculture. In beginning any study one must first of all see that it *is* a study:

(*a*) See that it has problems.

(*b*) See clearly what the problems are.

(*c*) Learn what has been done by others towards solving them.

(*d*) Test the conclusions of others by experiment and experience.

(*e*) Draw original conclusions and build on whatever solid foundation has been laid by those who have gone before.

To direct attention to the leading problems of the business an imaginary visit was paid to an apiary in early spring and the varied conditions of the colonies was used to illustrate the difficulty of wintering bees with uniform success. This showed the class that the wintering problem for example is a very real one. Then the changing seasons were brought into rapid review, and each shown to have its special difficulties in management. The most important ones were mentioned, and the remaining lectures are being devoted to a discussion of these, and of some of the established rules of management in each case. Owing to the total lack of apiary and equipment at the College no practical or research work can be attempted by the students this term. It is expected, however, that this handicap will be removed before another college year opens.

Before the lectures could proceed it was found necessary for the class to gain a working vocabulary, with definitions, of the more common terms, such as colony or stock, apiary, hive, swarm, queen, worker, drone, larva, etc., etc., also names of the parts of the hive and other things about the apiary.

To obtain any intelligent idea of the subject the underlying principles of bee-nature must be mastered. Bees are not domesticated in the same sense as the cow or horse. Through all the centuries that men have profited by their labors they have retained their wild nature quite unchanged. The insects that occupied the carcass of Samson's lion would have filled fancy, tall no-bee-way sections worth $2.50 per dozen if given the opportunity. Bees are simply wild insects kept in willing captivity by supplying them with the conditions under which they will thrive and produce honey. It is the purpose of these lectures to give the students some idea of what these conditions are and how to provide them.

In the time allotted to this work it is only possible to give the barest outline of facts with which every bee-keeper must be acquainted. The text-book which seems best suited to the purpose is "Langstroth on the Honey Bee, revised by Dadant." The students were advised to get copies of this work, and two copies of the latest edition were placed in the college library. Most of the students have their own copies now, and the lectures are based on selected paragraphs with marginal notes by the lecturer where his experience differs from that of the author. The subjects taken up are the general physiology of the bee, including external organs, and the respiratory, digestive and reproductive systems, the life history of the bee and something of the economy of the hive; honey and pollen gathering

and the ventilation of the hive, the requisites of a complete hive, handling bees, swarming and its prevention; queen rearing, feeding, wintering and spring management, pasturage and overstocking; honey production and marketing and the diseases of bees.

Most of the students show a live interest and ask a great many questions when given the opportunity. Some have asked for practical work and expressed a desire to specialize in the subject.

As bee-keeping is one of the most profitable lines of agriculture, it is to be hoped that in a few years it will take its place at the Ontario Agricultural College alongside of poultry, horticulture and other important departments. We trust the bee-keepers of the Province will co-operate in every way possible in this work.

REVIEW OF APIARY INSPECTION FOR 1909.

Report of J. S. Schrank, Port Elgin.

I visited 97 apiaries, and I found that 18 of them had diseased colonies. The number of hives in apiaries visited, 1978; total hives examined, 754; total number of hives diseased, 105. All these I called on the second time and put through the cure and it was done in good shape. There is a lot of pickled brood nearly every place I visited. Wherever I found foul brood I went through every colony they had, and where I did not find it after looking at the hives most likely to have it, I did not bother with the rest.

The President: You noticed pickled brood amongst the black bees more than the Italians?

Mr. Schrank: These were all blacks. It seems when you get Italians and do not re-queen for a number of years they will turn black again. Pretty nearly everywhere I went I found it was pickled brood.

Report of David Chalmers, Poole.

The second week in April I wrote to all whom I knew had foul brood in their apiaries in 1908, requesting them that if they had any colonies die during the winter to either close them up securely or carry them to the cellar, and when on my rounds I found they had all complied with my request.

I would recommend that some means be used to compel those who own bees to keep them in movable comb hives, and this can only be done by a revision of the Foul Brood Act; second, that quarantining diseased colonies should be practised in some cases.

Visited 81 apiaries, aggregating 532 colonies. Inspected 272 colonies, detecting disease in 56.

Report of Jacob Alpaugh, Eden.

As apiary inspector for Grey and Wellington for the season of 1909 I started out early and found lots of dead hives containing foul brood and honey which needed to be attended to, as they would very likely have been robbed out by some other hives in the yard or some neighbour's bees. I found foul brood very prevalent in the northern part of Grey County, all the way from Wiarton to Thornbury. It is quite bad in a good many sections of both Grey and Wellington. I

visited 132 apiaries—80 apparently free from the disease and 52 affected with foul brood. I have also found foul brood in some apiaries since I stopped inspecting.

Report of W. A. Chrysler, Chatham.

I visited 74 apiaries with 1,192 colonies, and found 20 diseased apiaries. Essex County is, I think, free from foul brood, except in cases that failed to cure from last treatment. I found two new cases in Kent County and one in Lambton. Altogether the situation is improving.

In the season of inspection of 1908, after the honey flow was over, I found one section of country about a mile square that contained eleven bee-keepers, seven of whom I found had foul brood in their bees. One bee-keeper at the time of my visit had two diseased colonies being robbed by his own and neighbours' bees. As it was too late in the season to cure all successfully, I arranged to have all colonies treated or destroyed that fall that would not winter through.

This season ten out of eleven of the bee-keepers had the disease in their bees and were treated during the honey flow. It occasioned two and sometimes three visits to each. I feel confident that the County of Essex is fairly free from foul brood. I found foul brood in four new localities: one in Essex, two in Kent, and one in Lambton counties. The three last localities were located after the honey flow was over. On the last two days of my inspection I found a locality badly infected with foul brood in the neighbourhood of several large apiaries. As an instance how foul brood has spread in this locality: A farmer in selling his goods and chattels at auction, sold also his bees, which also contained foul brood. These were sold and distributed in more directions and localities than I have yet been able to discover. I would recommend that all auctioneers in every county be instructed not to sell bees before being inspected. I made seventy-four visits to bee-keepers owning 1,192 colonies of bees.

Report of John Newton, Thamesford.

As inspector for the Counties of Elgin and Middlesex for the past season, I beg to report as follows: After reviewing the work for the past season, it is gratifying to note that there has been some little progress at least over the previous year. During this season I was out 22 days between May 26th and August 13th. During this time I inspected 86 apiaries, containing 2,797 colonies of bees, examined 1,290 colonies in those yards, finding 63 colonies diseased. I instructed bee-keepers in the best methods of curing and cleaning up their apiaries. In 1908, I found disease in 28 apiaries. This season I found 11 of those diseased yards entirely free from disease. Several others were greatly improved, while some are about the same as a year ago through carelessness or experimenting. I feel I must lay stress on those buying and selling bees. No one should buy bees without first knowing that they have been inspected during the year by one of the inspectors. Again, bee-keepers should not allow bees to be moved into their locality without their being first inspected. I would recommend in some instances early and late inspection.

Report of James Armstrong, Cheapside.

As inspector of Norfolk and Oxford Counties I beg leave to report as follows: During the season of 1909 I inspected forty apiaries. Out of the forty inspected six were diseased, this making only fifteen per cent. of the apiaries diseased. The total number of colonies inspected were six hundred and thirty-six. Out of this

number forty-four were diseased, this making about seven per cent. of the colonies diseased. In the season of 1907 about fifty per cent. of the apiaries were diseased and about seventeen per cent. of the colonies, thus making a decrease of thirty-five per cent. in the number of diseased apiaries, and a decrease of ten per cent. of the number of diseased colonies. So that it can be easily seen that we are making good progress in stamping out the disease known as foul brood. Not only is the dreaded disease being stamped out, but good men are going into bee-keeping all over this district, and those that were in it are using more up-to-date methods.

A word or two about the time of inspection: A limited time is a great disadvantage as the inspectors should have authority during the whole year to stamp out the disease or the spreading of it. For example, I might say that while spending the holidays last Christmas in Welland County, I got a rig and drove over to a bee-keeper's, about six miles from where I was visiting, and who had asked for an inspector last fall, that could not go as it was out of the time limit. The day I visited this yard the bees were flying and the weather so warm that hives could be opened without injury to the bees. But opening hives was unnecessary, as the combs he had in store had lots of foul brood scales in them, so I had a chance to tell him what to do in the spring and thus prevent it from spreading. In opposition to my suggestion some might say that it would give the inspectors a chance to make money when the bee-keepers were deriving no benefit, but this can be easily overcome by putting in inspectors who are not working only for the money that is in it, but have the interests of the bee-keepers at heart.

Report of Morley Pettit, Jordan Harbour.

My district for 1909 was the counties of Haldimand, Lincoln, Welland, Brant, Wentworth and Halton. The time was limited, the territory large and disease was dotted here and there over the whole six counties. Consequently no inspection work could be done where disease was not strongly suspected. Some disease was located only after it was too late to be properly treated. Incidentally some of the worst cases of foul brood were discovered in the most unexpected places. I would recommend that, if possible, two inspectors be placed on this territory next season or else one man who can give the work more time. A thorough inspection of every colony in the Province should be made as soon as possible. At present we are working largely in the dark. Of the apiaries inspected 25 per cent. were diseased. I have learned since the close of the season of other localities where disease is likely to be found.

I was sent to Trenton to investigate conditions in that region. Mr. Scott, the local inspector, will report the situation there.

Report of H. G. Sibbald.

In this season of 1909 I inspected 18 apiaries containing in all about 588 colonies. Out of this number 109 were found diseased, showing about 20 per cent. to be affected with foul brood. A few cases of pickled brood were found, but not as much as in the previous season. Bees were not in the best of condition generally, the clusters being small in the spring. The clover season coming later than usual no doubt would help these to get up in better condition for the season.

I regret that I was unable on account of pressure of my own work to do more inspecting. More should have been done in Simcoe County especially. It is a large county and has more or less foul brood throughout, and, in my opinion, would be

cleaned up more quickly if a county inspector was appointed. I find some very old men who cannot see very well and who are forgetful and cannot carry out instructions well enough to make a cure. There are also busy farmers who need an inspector to stay or return to the work and see it all carried out carefully if they are to make a sure cure. The 24 days allowed each inspector is only a patch on the garment for such districts, yet we appreciate the efforts of the Department of Agriculture in doing more than ever before and getting in closer touch with the work from year to year. If I may be permitted to say a word or two about my own personal situation in regard to inspection work, I am far too busy with over 400 colonies of bees in their different localities to properly look after inspection work and will be glad if the Department can find some one who can devote much more time to it.

Report of J. L. Byer, Mount Joy.

I cannot give the proper attention to the work, for the simple reason that I have not time to do it. I am not very much enamored with the job, and if the Department can find someone else to take it I would be greatly pleased.

However, I visited 45 apiaries, and I found 20 of them diseased. I think I was away 19 days. While I have no suggestions to offer as to how to better the situation, I might say that the bee-keepers want to learn about the disease. I remember the first time I saw foul brood I travelled 40 miles for the purpose of seeing it. The very next year it broke out in our section. That visit saved us hundreds of dollars. The situation, while serious, is nothing really to be alarmed at.

Report of W. Scott, Wooler.

My report of inspection work for the past season is as follows: I started and worked in all directions from home. As soon as I got past the disease I stopped and went in another direction. I finally rounded up the diseased territory. I found European Foul Brood the only disease of any consequence. I found the disease confined to the townships of Murray and Brighton, and it covers about 100 square miles of territory. It has nearly wiped out a great many apiaries. One apiary of 76 colonies was reduced to 16 colonies and others in proportion. I found some apiaries completely destroyed. All the bees inspected were black bees, so I expect the disease will return in nearly all of the apiaries treated, as I do not believe European Foul Brood can be cleaned up unless the bees are Italianized, and from my experience during the past season I would strongly recommend the yellow or golden bees. The law should be amended, giving the inspector power to order bees transferred on movable combs in any apiary where he thinks disease might exist. Fully one-half of the apiaries I inspected during the past season are not on movable combs. Disease could exist and the inspector not find it. If the disease has been in an apiary a few months there is no trouble in finding it, even if the bees are not on movable combs. It is the cases just starting that will not be detected if the combs could not be handled. Then I think the law should forbid the moving of bees from one locality to another unless the bees are first inspected for foul brood. European foul brood is the worst type of foul brood known. It travels over the country so rapidly that the strongest effort possible should be put forth to stamp it out. I believe the most speedy and effective way to stamp it out would be to pay the bee-keeper or owners for diseased colonies and destroy them, or if they were determined to clean them up they should be made to Italianize them.

Report of M. B. Holmes, Athens.

I visited a goodly number of apiaries widely scattered over a large area and of the yards so visited about fourteen per cent. had foul brood. In cases where from observation I was forced to conclude that the directions as to treatment would not be followed in detail, the destruction of the affected colonies by fire was advised as a short, swift and sure treatment and cure, and our orders were cheerfully obeyed. In other cases, where a course of treatment was prescribed, I believe everything is all right. Bee-keepers are thoroughly seized with the importance of this work of inspection, and show a ready willingness to render all necessary assistance. There are, however, small yards of bees in every county whose owners pay little or no attention, not knowing or caring what is inside their hives, nor ever feeling the need of an inspector.

Report of A. A. Ferrier, Renfrew.

As inspector for the counties of Renfrew, Lanark and Carleton I was able to spend only thirteen days on inspection work and travelling. I inspected thirty apiaries containing seven hundred and six colonies, of which sixty-two were diseased, sixty-one of which were black brood and one American. Most of the European was found in the one town and among parties having only a few colonies. I had time to inspect only one of these yards the second time. In it, where twenty-two colonies were diseased early in June, two months later only one colony showed a few cells of the disease. In nearly every case where I found trouble it was with men who take little interest in their bees, never heard of foul brood and seldom or never see a bee journal.

Report of J. Leslie McNaughton, St. Raphael West.

As apiary inspector for the counties of Glengarry, Prescott and Russell I have inspected during the season of 1909 one hundred and three apiaries. The total number of colonies was 4,057. Out of the above number of apiaries there was only one in which I found foul brood. In more than half of the apiaries I found dead brood, and have been called upon time and again to examine colonies in which none but starved brood existed.

A great many bee men are still ignorant as to the bee diseases and their results, but as a general rule they are willing to learn, see the inspection go on and do all in their power to keep down the disease. A few, but very few, are satisfied that they know all about bees. This last class I found the hardest to deal with.

Report of Homer Burke, Tayside.

I put in about fourteen days inspecting and examined some fifteen hundred colonies, most of the yards being small, and I am glad to say that I could only find foul brood in two yards and those were very bad. However, it being in the early part of the season we got them cleaned up and both men secured a fair crop of honey. I am quite satisfied there is not the amount of foul brood in the east as in the west, although it seems to be spotted in different places throughout the east, and I believe now is the time we should do all we can towards stamping the disease out of the Province. I have come across many men who keep from five to twenty-five colonies and have never heard of foul brood, and they are the kind of men that are hard to deal with when you do find the disease in their yard.

MY EXPERIENCE WITH EUROPEAN FOUL OR BLACK BROOD.

By W. Scott, Wooler.

In the spring of 1907 I was feeding all of my 112 colonies for the purpose of stimulating brood rearing. I first fed some buckwheat honey I had on hand, then I fed one barrel of Jamaica crystal sugar, then fed granulated sugar. After feeding the Jamaica sugar for some time I noticed the brood dying, but thought it was due to the cold, backward weather, but at the approach of warm weather the trouble continued and the larvæ had the appearance of foul brood. I notified the Department of Agriculture at Toronto that something was going wrong with my bees. In due time Mr. J. L. Byer called and examined my apiary and pronounced the disease to be European foul brood. He thought it better to send a sample to Washington, D.C., and have a test made of it to see if it was European foul brood, so I deferred treatment until I heard from him. In due time I received a letter from Mr. Byer stating that they pronounced the sample sent to Washington to be the real New York bee disease, or European foul brood. He also stated that I could treat the bees as I deemed best. As the season was very poor for honey I decided to use the Alexander treatment. So I killed all queens and united the colonies down to fifty. As many of the colonies were very weak in bees by the middle of June I kept the queen cells cut out and kept the bees queenless for 27 days, then gave each colony a young Italian queen, raised in another apiary. The treatment worked very well until the brood began to hatch, then the disease broke out in nearly all the colonies again. The Italians used were the three banded or leather-coloured stock. I put the fifty colonies in winter quarters and came out in the spring of 1908 with 45 colonies. The disease broke out again, so I decided to use the McEvoy treatment this time. I shook them and united them down to 23 colonies. I did not treat the hives or frames in any way, but cut out the combs and used same hives and frames. The disease broke out in one colony only. In about six weeks or two months I treated this colony as before and made a thorough examination for disease in all colonies, but found none in the remaining colonies. I placed the 23 colonies in winter quarters and wintered them successfully. I placed them on summer stands, April 6th, 1909. In fruit blossom time I examined all colonies and found them entirely free of disease. Towards the last of June I found disease in one colony. I at once examined all colonies for disease and found disease in eight colonies. The colonies were crossed between the blacks and Italians, and were the only colonies that contained disease of any importance. The rest of my bees were golden and leather colored Italians—about pure stock. I did not see any trace of the disease in the Golden stock, but saw a few cells in some of the leather-coloured stock. I found by close watch of the diseased colonies that the bees removed the diseased larvæ soon after it died, and the disease disappeared altogether in these colonies. I treated part of the eight colonies, and to the balance I introduced Golden Queens to test the matter as to the Goldens being entirely immune to European foul brood. It will require another season's watching to determine this. I procured a valuable breeding queen, the best I could buy. Her stock were dark Italians. Shortly after they built up into a full colony the disease broke out in them and the bees allowed it to run its course. I only bred a few queens from her, as I prefer the Goldens at present. After rounding up the diseased territory, as I have in my inspection work during the past season, I believe that the disease started in my apiary and spread in all directions from it. In one direction it has travelled fully ten miles in two seasons. I have no

positive proof as to how the disease was carried to my apiary, but always have suspected the Jamaica sugar as containing the germs of European foul brood.

MR. HOLTERMANN: I think Mr. House or some of the New York State delegation told me this morning that there were 38 States in which that disease had spread with great rapidity. I have been anxious from the very moment I heard that that disease was in this Province; and at that time I made a suggestion that those apiaries should be purchased immediately and destroyed, and the best arrangement made with the Department for compensation that could be made. We are in a peculiar position in connection with foul brood. Practically all the other diseases of animals are under the control of the Dominion Government, and there is reimbursement when animals are destroyed. It is difficult to follow on what ground the Province controls the one and the Dominion the other. When the Dominion Department of Agriculture stands all the expense in connection with hog cholera and mad dogs and so on, why could not there be an effort made to get the Dominion Government to co-operate in paying the expenses in connection with the suppression of European foul brood. I see no reason why that disease will not sweep over this entire Province as well as over the entire Dominion, if that is not done.

MR. HOUSE: When the disease first appeared at my home apiary we sent samples to Cornell, and Dr. White, at that time, pronounced it pickled brood; and wherever we found European foul brood since, we first found pickled brood in advance of it.

MR. SIBBALD: How many years after?

MR. HOUSE: Five years ago it first appeared there.

A MEMBER: Is it not against the law to keep bees in box hives?

THE PRESIDENT: Not exactly.

MR. ARMSTRONG: I think the inspector has power to deal with such cases. I will read the section (section 4):

"The Inspector shall have full power, in his discretion, to order any owner or possessor of bees dwelling in box-hives, in apiaries where the disease exists (being mere boxes without frames), to transfer such bees to movable frame hives within a specified time; and in default of such transfer, the Inspector may destroy, or order the destruction of, such box hives and the bees dwelling therein. 53 V., c. 66, s. 4."

If I found a case of that kind I certainly would destroy it after I gave the bee-keeper a certain length of time to transfer it.

MR. TIMBERS: I think it should be worded so that they have to transfer them in any case.

MR. BYER: Where he suspects the disease, would cover it.

MR. CHRYSLER: How can they transfer those combs and honey and everything? If a colony had the disease it certainly would be spread more by this transferring. I do not believe in transferring these old colonies, it is more dangerous than to leave them there. You can inspect bees in box-hives.

MR. MCEVOY: Certainly.

MR. HOLTERMANN: I do not see that an inspector has any authority to order the transfer of an apiary which is all box-hives until he has found the disease in it. That certainly should not be. At the same time, we need not talk about legislation to control people to have all their bees in movable frame hives, because you might as well have a law that a man shall keep his chicken in a certain way. It seems to me it should be so corrected that where the disease is found in the neighbourhood, or where the inspector has any reason to suspect, that there he may order the transfer.

MR. CHRYSLER: Is there any inspector who could himself transfer the bees safely? It cannot be done safely without robbing and spreading the disease.

MR. TIMBERS: I think I could transfer them without breaking up the combs or anything.

MR. HERSCHISER: Mr. House, I believe, says his bees have all been touched with European foul brood. It appears the more he has of it the more honey he gets, and I would like to hear from Mr. House.

S. D. HOUSE, Camillus, N. Y.: In stating how I get so much honey with European foul brood, perhaps I would have to go into quite a talk. First, it is partly system. When the disease first appeared in my apiary I did not know what it was, and I called the inspector's attention, and they sent samples to Cornell, and it was pronounced pickled brood. I had eight colonies affected out of 160 some odd. The next spring those same eight colonies had European foul brood, and the same season we had 100 and some colonies that showed European foul brood. I tried 40 colonies upon the Alexander system. My bees are a cross between the Italian and Carniolan, and I failed generally in the Alexander system with this strain of bees. Then I followed the inspector's instructions of shaking, a single shake, upon a new hive with new foundation, and I found where I had the dark races of bees I might shake them one, two or three times, but I still had the disease, but in the meantime I had procured some honey by tiering up two or three colonies to make one very strong, and stacking up the combs on another diseased colony in which the brood was hatched out, and giving this new colony a strong family of bees; but it contracted the disease again later in the season after the honey flow was over. It was discovered the Italian bees were able to contend with this disease. The Italian would carry out the larvæ before it came to that watery stage that it could not be handled. I have seen the disease when it was in the hive with an Italian colony of bees and not 100 sealed cells, and you could not find 100 capped cells of larvæ in the hive, the queen laying every day her full capacity of anywhere from two to four thousand eggs, and as soon as they were hatched, out they went. That operation was continued until it was cleaned up.

I am curing up European foul brood, returning my old comb from a diseased colony back to a colony again, and putting bees on them and going ahead.

MR. HERSCHISER: You do not destroy the comb then?

MR. HOUSE: No. I did at first.

MR. BYER: Do you not find your bees are more immune after it has been in the locality a while?

MR. HOUSE: Certainly they are, because they are getting in Italian blood. You cannot cure European foul brood with black bees; I do not care how many times you shake.

MR. HERSCHISER: I want to know if the combs that are above a queen excluder in a colony that has this European foul brood and become diseased, can be used again?

MR. HOUSE: They certainly can.

MR. HERSCHISER: Supposing they are black bees, is there any disease in those combs?

MR. HOUSE: That would depend upon whether there is any honey there or not. The scale is not there in that comb. The germs lie in the scale, and if the bees can polish up the comb, they will do so. I have cured it by feeding.

MR. HERSCHISER: You would not destroy a comb that had not been used for brood?

MR. HOUSE: I am not destroying those that have been diseased; I have caused the bees to clean them up.

MR. HERSCHISER: I think there is a good deal in a bee-keeper who understands his business real well. That would be dangerous for a novice to do. I can see why it would be dangerous to advocate the use of these combs. I would be inclined to destroy all combs and start with a new yard.

MR. HOUSE: A year ago I replaced 40 supers of brood combs that had been diseased, and stacked one pile above the other, and allowed them to run as extractors with zinc below. The honey and brood combs were placed back in 40 different colonies in the fall to winter. Out of that 40 colonies I had three colonies where the disease appeared. Eventually they cleaned that up, and those hives are perfectly free from it to-day, and have kept so, some of them, for three years now.

MR. HERSCHISER: All you do is just put in Italian blood?

MR. HOUSE: Yes.

MR. BYER: Have you a special preference for Golden Italians?

MR. HOUSE: I have what I call the four banded. I do not believe you can give the disease to an Italian colony of bees unless by direct introduction. A colony left entirely alone with the diseased comb has cleaned it up.

MR. DICKENSON: You would not recommend using the old combs?

MR. HOUSE: Not with American foul brood. That is the difference between the European and American foul brood. The European is much more rapid in its travelling, but it is much easier to cure.

MR. JOHNSON: Have you any theory as to how it spreads?

MR. HOUSE: No, I have not. I think possibly it could be brought in by robbing. I have not a comb used for extracting, but what has been diseased, and they are to-day in use, and I have not had but three colonies that it appeared in this season, and they have cleaned it up.

THE PRESIDENT: All of us who have seen what we call dead brood or anything of this kind find it has been among black bees.

MR. HOUSE: We have apiaries that have been thoroughly Italianized before the disease appeared, and there has never been a particle of the disease found there, and it is all around.

MR. BYER: What about Carniolans?

MR. HOUSE: They are not as good; they are not as immune.

MR. HERSCHISER: Given an apiary of black bees that are predisposed to the disease, I have heard it said you cannot cure them of European foul brood on the same ground. How is that?

MR. HOUSE: I do not know where they get the disease.

MR. HERSCHISER: Suppose you treat every colony in the apiary, will they carry it in off the same ground? Is there enough of it around there?

MR. HOUSE: I think so.

MR. TIMBERS: I would like to ask Mr. House what an Italian bee is? Does that mean from an imported stock from Italy, or a queen bred in America whose ancestors have not been in Italy for perhaps twenty years?

MR. HOUSE: The race of Italians has been in America for perhaps twenty years, but the original stock was imported. The Italian bee is a better housekeeping bee. The propensity for cleanliness of the Italian bee is so far superior to the black bee that it will not allow any dead brood to lie in the cells.

MR. TIMBERS: They tell us the Cyprian queens are yellower by far than the Italians. Is it the golden blood of the Cyprian that is cleaning this out, or is it the Italian blood?

MR. HERSCHISER: It is the good housekeeping blood.

MR. TIMBERS: I believe there is more in that than in the colour of the bee.

MR. HERSCHISER: How about hybrids; they are always good honey-gathering bees?

MR. HOUSE: They are, but I have had hybrids that would clean up.

A MEMBER: If you had a colony affected by foul brood to-day and you should Italianize them, and they should clean up the hives, would it be safe next year to put black bees on again?

MR. HOUSE: No, you would be just as sure to have black brood there. Black bees get it anyway; they are bound to have it.

MR. HERSCHISER: If I should get 100 of your clean combs and put black bees on them, would my bees get foul brood?

MR. HOUSE: Yes.

MR. HERSCHISER: Your combs are diseased then.

MR. HOUSE: They certainly are. I want to emphasize one point in regard to Italian queens. I believe that where there is a colony of bees that has been thoroughly diseased, that the queen is also diseased, and I would advocate that the queen be killed. I notice here that in using the Alexander system you have been introducing laying queens instead of capped cells or virgin queens; it is all wrong. We want to get those bees in such an excited condition and so crazy for brood and to carry on their existence, that they go to work and polish up the combs, before the queen gets to that laying point, during her mating. You cannot cure European foul brood under the Alexander system with black bees. I do not care if you carry it out a thousand times.

MR. ROSS: Didn't Mr. Alexander recommend the introduction of virgin queens?

MR. HOUSE: I believe he did, and that they must be Italian queens, but I believe that point has been overlooked. Until you can get a new generation of Italian bees there you are going to find black brood.

QUEEN REARING AND HONEY PRODUCTION.

By F. P. ADAMS, Brantford.

It is the writer's wish in the present paper to bring before beekeepers the importance of the practice of artificial queen rearing in connection with the production of honey. In order to have strong, populous colonies it is essential that the queens be vigorous, but many of the manipulations now practised, while they accomplish the objects sought, yet they have a very certain and harmful effect upon the queen stock raised under the artificial conditions imposed.

New and better methods of handling bees are constantly being developed and the hand of man is now employed in regulating their natural instincts, but when we undertake to pit our understanding against the forces of nature we must make sure that our interference will not result disastrously in ways that we least expect.

Artificial swarm control, artificial divisions for increase and artificial stimulating are now successfully practised, but the subject of artificial queen rearing, which should go hand-in-hand with these, is handled rather gingerly or left in the hands of specialists, and yet a knowledge of this subject is the basis of success with the others. If we prevent our bees from swarming, where are the young, vigorous queens to come from to head next year's colonies? Of what use are artificial divisions if we cannot supply them with properly raised cells, or of what advantage is stimulative feeding if we do not have queens in the hives with vitality enough to respond to the stimulating?

It is very interesting and instructive to trace the development of the methods now largely employed by bee-keepers to obtain increased yields of honey and at the same time to keep under control the natural swarming impulse. It may also be instructive to note how these manipulations affect the welfare of the colony in the generations to come.

Probably the simplest manipulation is hiving the swarm on the old stand, thus throwing all the field bees in with the new swarm to give an added impetus to honey gathering. This manipulation certainly accomplishes the object sought. It concentrates a tremendous force of field bees for gathering in the crop, and as there is no brood to look after for a few days the honey piles up very rapidly in the supers. But what about the partially developed queen cells in the old colony that has been drawn on so heavily for bees? Does it seem reasonable that they will receive the warmth and attention so necessary to their growth into good, vigorous stock?

Another manipulation generally practised is the control of troublesome after-swarms by breaking down the cells left in the hive after the departure of the prime swarm, leaving only one cell to hatch out. This also accomplishes the object sought. No after-swarm will issue if there is only one queen cell present in the hive, but the same objection applies here as in the former case. The few bees in the large chamber will not give any more attention to one cell than they would to six. If the nights are cool, they will cluster in the centre of the hive, perhaps away from the queen cell, leaving it unprotected, and the young queen will thus be injured.

Next in order is the practice of universal shaking. By this method colonies are examined every few days and any found making the first preparations for swarming are shaken on to new combs on the old stand and the brood disposed of in various ways. From the standpoint of improvement in the stock this method is the most rational of any since there is no endeavor made to raise queens under unfavorable conditions, and the bee-keeper is forced to work out some other method of propagating his stock. We must all face this problem sooner or later, and although there are many difficulties awaiting the bee-keeper who proposes to raise his queens artificially, yet after he has mastered the subject I believe that he will consider the time well and profitably spent. The system of shook swarming lends itself admirably to production of the finest queens, and it is the writer's wish to sketch briefly such a method, one that can be readily adopted by any careful bee-keeper.

Wait until colonies are being shaken and there is plenty of brood in upper storeys.

There is nothing in the system which we use but what any bee-keeper can adopt. It is a well known system; it has been developed from several different queen breeders. We use the Doolittle plan for grafting cells, and the other apparatus is simply development along lines which will help in the making up of

increase and making of nuclei. I think the first requisite in any operation for making up artificial queens is in getting the colonies in proper shape to raise them. A great mistake made is the starting to raise cells before the colonies are in condition, and starting to make increase before the brood is in condition for making up that increase. I believe it would pay any man to wait until his colonies are in shape before he starts any manipulation with the object of raising queens. We usually wait until the colonies are strong, and until possibly there are a few starting to prepare sealed cups. These colonies are shaken off on to new combs. The brood from these colonies is distributed around the yard to other stocks—possibly two or three combs given to one, and two or three to another, and it is not always given to the weak stocks either. It is given to the medium stocks usually, and these medium stocks are built up until they have brood above, until it is necessary to put on queen excluders; and when they are in this condition I believe the yard is in good condition to start queen rearing.

The first step, of course, after the brood is in shape, is getting the cells started. The cells are grafted by the Doolittle system into prepared cell-cups. They are grafted from the best breeder in the yard, and I do not think it is necessary to go into details of this, as it has been described so often. Before the grafting is done the swarm box is used. A swarm box is simply a box made like a hive to hold three combs, and it has a cover with a slot in it to hold this stick of prepared queen cells. The bees are simply taken and shaken into this box—that is, enough bees to fill the box nicely. A frame of honey and a frame of brood is put in, one on each side. The box is left in that condition for five or six hours until the bees realize their queenlessness and are ready to accept cells. Then this grafting is done, and the grafted stock of cells is put into the box. Usually the shaking is done in the morning, the grafting is done in the afternoon, and the cells are left with the bees until the next morning. By that time, those that have been accepted have been fed quite a bit of jelly, and they are then taken and put into the colony that the queen has been taken from, and the frame of prepared cells is put above the queen excluder with the queen below. The frame that holds the queen cells is simply an ordinary frame fixed up so that it will fit in. It is put in the centre of the upper storey of the cell-building colony. They go ahead and complete those cells, and when they are ripe in about ten days' time the cells are put into nuclei. Now, by having so much brood above queen excluders in the yard, the yard is in good shape to make up the nuclei, because the brood is capped over, and there would be none lost by neglect or chilling; and by taking one or two frames of this brood that has been entirely capped over in rearing above, and giving it to the nuclei, we have the nuclei started. Any shaking after that can be done; and an occasional frame of this brood is put above the queen excluder and given to the nuclei and the young colony is built up in that way.

I think it is a very nice way to introduce queens, by giving ripe cells, much simpler than introducing laying queens.

Mr. Newton: I believe, just as Mr. Adams says, that the time has come when bee-keepers will have to do something, because our mode of working as it is to-day is very different from what it used to be a few years ago.

The first thing that struck me in Mr. Adams' paper was that in order to have good strong, prosperous hives we need good queens, queens that are always on the alert, that are ready for business; and if we do not have them we are sure that we will not have the good big stocks of bees, and we will not secure the crop of honey which we set out in the spring to do.

At our Convention in London just a week or so ago, one gentleman was talking about some hives of bees that he had that would neither give him honey, increase, nor anything else. Well, I said that there was sickness there, and that those were the hives that ought to be doctored. I think a man that has a bee-yard and has hives in that shape ought to be the doctor and should go right after those hives; and the first thing he should do is to find out what kind of queens are in those hives, and if they are not good queens he should replace them with such queens as Mr. Adams has mentioned in his address—vigorous queens. And I also believe that good, vigorous queens cannot be produced under the circumstances which Mr. Adams has spoken of, that is, shaken-swarms. I thought that the idea of raising the cells from those stocks that had lots of bees and were in good shape to produce cells, as Mr. Adams has said, was the right one.

We have several queen breeders now in Canada that we had not a few years ago, so I think it ought to bring up a good discussion. We have some with us this afternoon.

Mr. Chrysler: Wherever Mr. Adams puts them, does he introduce the cell instead of the queen?

Mr. Adams: Wherever it is possible to introduce cells, we always make a practice of using them that way. It is much easier to introduce that way than introducing virgin queens.

Mr. Dickson: Does Mr. Adams think that the artificial queen is healthier?

Mr. Adams: The great trouble I find with many bee-keepers who have tried this plan is that they start raising queens too early in the season before the bees are in shape, and my experience is that with my plan you get great deal better queens once you get started.

Mr. Dickson: I have followed that system for four or five years, and I have received excellent queens.

Mr. Newton: I have introduced during the past season about thirty queens, and thus far I have found them very vigorous, and have been well satisfied with the change that I have made. Do I understand Mr. Adams to say that good queens could not be raised from the old colony where the swarm has issued from?

Mr. Adams: It depends on how that old colony has been treated.

Mr. Walton: I have used that system quite a few years, of grafting cells. I did not use it on a stick. I used it on half drawn combs. I do not know whether that would make any difference.

Mr. Adams: I do not think so. It is just a matter of convenience. I like the idea of having the queens all of the same age and knowing just when to start manipulations.

Mr. Herschiser: As I understand it, Mr. Adams claims that the queens will not be as vigorous, because if the colony from which the swarm issues is moved to another stand, the queen cells will suffer and therefore will not be as vigorous. Now, I think it is the rule that the colony swarms when the queen cell is capped or just about to be capped, or fully fed up. I would like to know if it is the opinion that any neglect that the cells might suffer would have any effect on the vitality of the queen?

Mr. Adams: Yes, sir, I believe it would have a very big effect on the vitality of the queen. Of course we all know the swarms issue at different stages. Sometimes the cells are just capped over. Well, from that time I think it is just as necessary that that young developing larva should be properly protected as it is

that an egg should be properly protected. If it gets a chill any time during this development it is sure to show in the queen.

A MEMBER: It would not hatch if it got a chill, would it?

MR. ADAMS: It will not be the same queen.

MR HERSCHISER: It will depend upon the weather.

MR. BYER: The men who breed queens have been responsible for a lot of poor queens.

MR. HERSCHISER: As a rule queen cells are sealed over when swarming begins. I do not find that always to be the case. Very often one or two cells are sealed over. I have had them swarm under those conditions. I believe that this slip-shod method is responsible for a lot of poor queens.

MR. BYER: On the point of commercial queen rearing, I do not know what others have found, but I have found, regardless of the fact that the business is increasing by leaps and bounds, that with the majority of queen breeders it is not a question of how many queens they can sell, but how many queens they can produce. They find ready sale for the queens at the present time. I sometimes wonder if, in the hurry of the season, some of the little points are not neglected. I have bought a lot of queens from a breeder, and had almost universal satisfaction. Then again I purchased two dozen, and a dozen of them were not worth the mail charges. We got them from a queen breeder of international reputation.

D. ANGUISH: I was just going to ask the question how it was there were so many of the queens turned out to be no good from these men that make a specialty of queen rearing. Of course I do not buy a great many queens, but I get a few every year, and there is such a difference in them from the same men. Whether it is my fault, or whether the fault of the men that send out the queens, I do not know. I say a man should raise his own queens as much as he can. I do not think a man raising queens gives his bees the same chance as a bee-keeper does. I have got a couple of hundred colonies, and those I raise my queens from next year are the best colonies I have had this year. I think a man should try to raise all he can from his own colonies, not saying that the specialist is not doing the best he can. A great many of them are in the queen rearing business and not in the honey business.

MR. MCEVOY: How many queens do you raise on that stick of sixteen cells?

MR. ADAMS: From twelve to fifteen.

MR. WALTON: I presume Mr. Adams is one of the most practical and the largest queen breeder we have in the Province. I think it is quite time that we put a little of our genius into queen rearing, for I believe that is very important. I would like to ask Mr. Adams under what temperature he introduces larvæ?

MR. ADAMS: During the summer, while the weather is warm, just the natural temperature of the summer weather, before it gets cool in the evening. Of course in starting cells very early it is necessary to use artificial heat. In the last few years we have found it is necessary not to start very early. It is better to wait till the weather is warm and settled before starting operations. We start about the 1st of June.

MR. WALTON: Is the 1st of June the earliest?

MR. ADAMS: Well, the 1st of June was our earliest this year. This is one of the fine arts of bee-keeping, to rear good queens; and it is a fine art that we

ought to pay more attention to if we want to get good queens. We talk about black brood and foul brood and all these things, but I tell you that if we had first-class queens and good stocks of bees we would not have so much foul brood. And in reference to having the larvæ well fed, I would like to say, what better is a queen that has a third more royal jelly after she has matured than one that has had enough?

Mr. Adams: I think it is better.

Mr Herschiser: If I was going to take a trip to the North Pole. I would want to take a little more perhaps than would last me. (Laughter.)

A Member: I would like to ask Mr. Adams if he uses the queen nursery?

Mr. Herschiser: I have heard indirectly that some of the largest queen breeders we have are using an incubator for the nursing of the cells after they have been capped over. I do not know whether that is a very good scheme or not. I am not a queen breeder, and I do not know anything about it.

Mr Adams: Of course by a queen nursery I mean a frame of small queen cages, that is, cages that are inserted in the brood nest of the hive.

Mr. Walton: It appears to me that we all have ideas which, if carried out, would possibly be injurious to queen rearing. For this reason, as far as my experience goes in queen rearing, we must conform to the original working of the bee in propagating the cells, and if you follow their ways as much as possible I think you will get better queens. Unless we have a certain temperature we cannot follow in the line of the bee, and, as Mr. Herschiser has just said about the incubators, they are a success when everything is properly carried out, but otherwise they are a failure. Just the same with queen rearing, how could ordinary beekeepers get a certain temperature without a great deal of practice and skill and possibly expense? How can we get an incubator to incubate those cells?

Mr. Adams: I never heard of an incubator being used before.

Mr. Herschiser: The largest queen breeders in the United States are using incubators.

Mr. Schrank: I ran across quite a few of the queens that Mr. Adams shipped out last year. Whatever method he has, it seems his queens turn out pretty good.

Mr. Ross, Montreal: Do you not think that in breeding our stock we are losing sight of a great fact, and that is that we have no possible power of selection? We are breeding our stock, and if we breed in an artificial way under conditions that are purely natural from selected stock, we are standing a great deal better chance of improving our stock.

Mr. Herschiser: That is a good suggestion, but there is no way of getting around it. If you want to rear queens by the natural process, and you take and put on black bees that have swarmed and go through and take out the combs and extract the the larvæ from the cells—and you can easily take the larvæ from your best queens—you will have selected stock then, and you will have all the advantage of rearing queens in the natural way.

Mr. Timbers: Why not take the comb from your selected colonies and give it to the other colony? I have been practising that for three years now, and it is far ahead. I saw somewhat the same plan explained a while ago by a gentleman from the other side in the Canadian Bee Journal.

Mr. Miller: I do not think there is any fear of handling larvæ. It is a great advantage over transferring combs or making queenless colonies, or anything

of that nature. You may rear good queens if you give it the time, which is much less than is required for handling your combs. The grafting system I find the most successful. I think you will find if you will take time, it is almost all that any bee-keeper will need, and you will have great pleasure and success in doing it.

Mr. Pettit: I think it simply amounts to this, that queen breeding is a business by itself; that we are keeping bees under artificial methods, and artificial methods must be adopted in all lines. Now, if a honey producer is going to breed his own queens, that must be a line to work out by itself, not allowing the bees to swarm, and running chances on getting your good queens from any stock that happens to swarm, but making a special branch of the business of breeding queens. I think honey producers find it more profitable to buy their queens. If a man is running a series of different apiaries, and he is busy with honey production and most of his time is taken up with that, he cannot do very much queen breeding. It is not profitable to allow the bees to raise their own queens and do their own re-queening. It just comes down to this, we must recognize each line of our business is a business by itself; extracted honey production, comb honey production, queen breeding, and all these different lines must be worked out in an artificial way by themselves.

Mr. Timbers: Do I understand Mr. Pettit to say that a honey producer cannot raise his own queens, and that he must buy them? My experience has been, I have bought queens from every State in the American Union, and I have never got a queen yet that I could not find a better one in my own yard. That comes pretty hard, perhaps, on our friends on the other side. I mean that a man who cares to take the time that is necessary can raise better queens than he can import or get through the mails.

Mr. Pettit: How many yards have you, Mr. Timbers?

Mr. Timbers: I have two.

Mr. Pettit: It just depends on the circumstances. If the man is able to be home every night he can probably rear his own queens. But supposing he has to leave home on Monday morning and not back till Friday, he has little time on Saturday to look after his bees. He only sees his bees once a week. There are commercial travellers, and men in other lines of business, who are keeping a few bees as a side line.

Mr. Lowey: I rear my own queens. The last I got were the finest I ever had. I have bought queens from queen breeders, but some of my own queens will outstrip them all. I look after the swarms, but I don't find any less bees in the hive after they swarm. I have opened, I might say, dozens of cells, and I noticed royal jelly left they had hatched.

HONEY PRODUCTION IN THE EAST.

By H. E. Eyre, Chantry.

I was invited here to talk to you about honey production in the east. I think there has been a steady improvement during the past few years, and bee-keepers have been doing better. In 1907 the Bee-keepers' Association provided us with an inspector. The bees had not been doing well. Some of the bee-keepers were afraid there was something wrong, but thought the bees would get better themselves without an inspector. Men who had not been very successful, when the right man

comes to them and approaches them in a proper manner, are usually glad to learn, and we want them to learn, and we want to have more bees than we have. In the township where I live we have got ten good cheese factories, and at least 200,000 cows, and I am not sure but what our town is as well situated for bees as it is for cows. Some twenty years ago Prof. Robertson began a revolution in dairying, and it helped out wonderfully in our county. The keeping of bees is not going to work to the detriment of the keeping of cows. In fact, I don't know but that it would help. I don't agree with many men who think they cannot make it a side issue. They are renting a house, perhaps an acre of land; there is some place there they can set a colony or two of bees. They can supply themselves with honey. They have some cash, and, instead of being hard up, have some of the table luxuries; they have the very best, the very purest, and the most healthful, at a small cost. If there is any line in which this Ontario Bee-keepers' Association can be of benefit it is in encouraging people to start keeping bees. I do not mean to start a great big bee yard. We cannot all expect to be a Holtermann, and we can't all expect to be a Couse, and I don't know that we can all expect to be a House; but I am sure we expect to be something, and to do something for our fellows.

EXECUTIVE REPORT, 1909.

The membership of the Association for the year is 276. Of this number 174 came in from the affiliated associations, the balance in single subscriptions. There has not been much change in the membership from year to year, and it is just a question whether a special effort should not be made to increase it through the organization of local associations in other parts of the Province, and also through soliciting single subscriptions from bee-keepers where there are not enough to organize associations. The section of the Horticultural Exhibition devoted to honey, shows in the entries that there is very little competition from other than two or three of the large exhibitors. This is disappointing, and something should be done to effect a change.

Last year there were entries received from quite a number of smaller bee-keepers, but this year there are practically none except three large men who make a business of attending these exhibitions. The prize list was revised this year, so as to reduce the number of sections, but increase the prizes with the hope that other parties would be induced to show. This, however, has not had the desired effect, and there is no doubt that the exhibition does not serve the purpose that it ought to. The sections cut off were those calling for new inventions, packages, etc., and which were found to be of no value.

The Foul Brood inspection was again carried on during the year through the Department. The districts were reorganized and fourteen inspectors in all appointed for the Province. The grant was raised to $2,500. The full amount has been spent, and it is to be hoped that the reports of the inspectors will show that some gain has been made in checking this disease. The inspection in the east has shown that Black or European Foul Brood has spread much farther than a year ago. The address by the inspector for one of the eastern districts will, it

is hoped, bring out a full discussion on the best methods of treatment for this disease.

The Department again prepared a report on the condition of the industry which has been sent to all parties interested.

REPORT OF REPRESENTATIVES TO EXHIBITIONS.

By J. D. Evans, Islington.

At a meeting of the Committee of the Toronto Industrial Exhibition Association, who had charge of that matter, there was a discussion on the part of that committee to remove the exhibits of the bee-keepers into the old building near the western entrance, in connection with the dining-hall. The provinces were going to make exhibits and the room would be required, and part of the room would also be required for the flowers and vegetables. I thought the bee-keepers had been chased around from one place to another. I, of course, alone represented the honey men, and we had several bad fights about that, but finally it was suggested that the honey exhibit be moved to the dairy building. That didn't strike me as being a very good place. However, at the last meeting of the Committee Mr. Grainger and the President (Mr. Couse) and Mr. Laing, were satisfied to have the exhibit in the dairy building. The exhibit I believe was a very good one, but you will notice that the second and third prizes on our Association's "best display" were cut off, only one prize being given. I agreed to give $25 on condition that the exhibits were satisfactory to the honey men, otherwise I told them we wouldn't pay it. I think the exhibit was one of the best we have had.

I think whoever represents you in the future should appear before the Executive and insist on the second and third prizes being continued as heretofore. I think it would be advisable for the exhibitors, as much as possible, to keep on good terms with the Association and not put them to any unnecessary trouble. Friction should be avoided as much as possible, and I think there are details that ought to be decided by this Association at this Convention. I think this Association should settle the question as to whether men should exhibit honey that is not the product of their own apiaries.

A discussion here took place participated in by Messrs. Timbers, Hershiser, Grainger, Holtermann and Evans, on the question of whether exhibitors of honey should be confined to exhibiting their own production, or whether they should be at liberty to make exhibitions of honey produced by others as well. The feeling of the meeting was strongly in favour of confining the exhibition to the bee-keeper's own product, and the following resolution was adopted: "That this Association is strongly in favor of and advises exhibitors of honey at exhibitions to make an exhibit of their own production only."

Report of W. J. Brown.

I beg leave to report as follows: As your representative to the Central Canada Exhibition, I would say that a most creditable exhibit of honey was made by four or five bee-keepers. The officers of the Central Canada Association have on all occasions treated the honey producers with great consideration in every way, particularly in their liberality in granting good prizes to those of us who patronize their exhibition.

DIRECTORS' REPORTS.

Division No. 1: Alex. Dickson, Lancaster.

The honey industry of eastern Ontario is not up to the standard of former years. There have been a few years of failure which have discouraged quite a number of beginners, but this last year more are going into the business, especially in Glengarry, owing to the crops of 1908 being exceptionally good.

In the district that is allotted to me as one of the directors, I find that the crop has been rather varied. On the east boundary of Glengarry it went up as high as 125 lbs. per colony, other parts only 25 lbs. per colony. In the county of Prescott the average was 50 lbs. per colony; Russell something the same. Stormont and Dundas also show a very good average.

Throughout the whole of this district there was a good flow of buckwheat honey. One remarkable report received from the north end of Dundas was a yield of 142 lbs. per colony of fall honey, all from the touch-me-not plant, which sprang up in a swamp that fire had gone over last fall. Strange to say this same yard had in the beginning of the season great difficulty with foul brood, but the colonies were put in good shape under the instructions of Mr. Burke. I find that quite a number of bee-keepers are very careless about feeding up in the fall, which accounts for so much winter loss. A few do not take bee journals, hence the lack of knowledge, and even those who know better are careless about feeding.

The spring of 1909 was exceptionally late for putting out bees, the last three weeks being much later than usual, so that when the honey yield was on the colonies were not in condition to take advantage of the flow.

Altogether the prices were firmer this year than last, although the yield was not quite so abundant.

Division No. 2: Alex McLaughlin, Cumberland.

Taking in about ten miles of country on each side of where I live, we have about thirty-five bee-keepers. The number of hives kept by each varies from two to one hundred and thirty, the average being about twenty. Only a few give them enough attention to receive any profit, and our best bee-keepers are found among the members of our Bee-keepers' Association and who are receiving bee journals. Our local association hold a midsummer meeting or picnic at one of the member's homes, where bees are kept, which we find very helpful, especially to beginners. We hold our picnic about the end of June when the bees are into the honey flow, so that we can have practical work among them. We also find it a help in securing new members. Our district is a good one both for quality and quantity. A single colony has often gathered over two hundred pounds in one season, and one hundred pounds of an average where over a hundred colonies are kept. The quality is also second to none.

In regard to disease among bees we are pleased to receive visits from the inspector yearly, as few of the bee-keepers would know foul brood if they had it and through their lack of knowledge allow it to spread. So far we do not know of any in this district.

Division No. 3: H. E. Eyre, Chantry.

The people interested in the care of bees or actually engaged in this industry in the district which I represent have during very recent years suffered very heavy losses. That reverses of this nature and magnitude would exercise a most dis-

heartening influence over those by whom they are met goes without saying. It seems a very natural result and following on the heels of this discouragement, there comes in a few instances (a very few happily) the resultant apathy and lack of interest which inevitably brings with it the neglect and complete loss of whatever remains of the business in the instances referred to.

As to the cause of losses and reverses I suppose there have been various causes, and they may be classified under various headings: "Unfavorable seasons"; "Unfavorable localities"; "Unfavorable bees"; "Unfavorable Bee-keepers," and a whole lot of other unfavorables, and any one of which may write "Failure," and behind which many a careless bee-keeper finds a convenient place to endeavor to hide his carelessness.

We have a goodly class remaining, however, who are made of the stuff that does not collapse at the first nor second approach of misfortune and reverse; who have confidence in apiculture and are demonstrating that fact. In the hands of this class in our district the bee-keeping industry is recovering from the losses to which I have referred, and this noticeable expansion will, without doubt, be greatly accelerated by the additional good men and true who will, in the near future, conclude to embark in the business of honey production. The season just closing has been quite satisfactory in both honey and increase of colonies. With the improved condition of clover as compared with the same in the autumn of 1908 we may reasonably expect that 1910 will be the banner year. There is and has for some time been a dread of disease among the bees in the district and recent developments as shown in the Inspector's report prove most conclusively that the fear of existing contagion in our midst was well founded.

Division No. 4: R. Lowey, Woodrows.

Bees came through the winter better than for last few seasons, but we had the coldest April, though no heavy frost, I remember since keeping bees. No pollen gathered until 2nd of May. No brooding, hence bees were in poor shape for clover, which, however, was later than usual, which helped some. A fair crop was taken in this section. Bees increased about 40 per cent.; no disease so far as I can learn. I think some advance is being made in bee-keeping in this section, but there is much room for improvement yet.

Division No. 5: Jas. Storer, Lindsay.

Bees that were properly put in winter quarters in the fall of 1908 came out as a rule in good order in the spring, the average loss being about 5 per cent. Most bee-keepers put their bees on summer stands about the first week in April. The first week in May would have suited them better. The weather was very cold till nearly the end of May and some spring dwindling took place. The clover honey season was at least ten days later than usual and lasted only from the 25th June till the 16th of July. It came with a great rush while it lasted and most bee-keepers obtained about the average crop given by the honey exchange.

A great deal of buckwheat is sown in this locality and the weather being favorable a good crop was obtained by the bee-keeper that looked after his bees. So much honey coming in late left the hives with plenty of young bees to commence the winter with.

A few honey dealers seemed to be very anxious to get hold of all the honey produced and paid a very good price. Now some complaints are made that they are overstocked, no doubt owing to the heavy crop of small fruit.

On May 25th we had a good meeting of the local Bee-keepers' Association at Lindsay, when we had several addresses from Mr. Sibbald.

Division No. 6: Wm. Couse, Streetsville.

The bees in Halton and Peel counties wintered in fair to good condition, and were in good condition to commence on clover, which was in good shape during two weeks in June, but owing to dry weather the bloom did not keep as full and fresh in July. Nevertheless bee-keepers here secured a good crop of excellent honey, and have been able to sell readily at a good price.

Red clover yielded very well, and bees stored considerable surplus. Buckwheat, where grown, yielded well, but only a very little grown. Foul brood is almost cleared up in this district.

Division No. 7: J. M. Switzer, Orangeville.

Bees on the whole came through the winter in fairly good condition. Those wintered outside in packing cases, built up very much faster in the spring than those that were wintered in cellars, which in some places suffered a severe set-back through spring dwindling caused mostly by the long continued cold and wet weather during the spring and early summer, while bees still in their winter packing did not suffer to any great degree from this cause. Pickled brood, which seems to be on the increase in some places, weakened the force of workers for the honey harvest also to a great extent. The yield of honey in alsike clover sections has been very good, above the average in a number of apiaries, while white clover failed to yield honey as in former seasons, especially in the northern portions of the district.

The fall flow of honey from buckwheat, golden rod and other sources has been above the average and consequently bees have not required the usual amount of feeding up for winter stores as in former years.

In sections that were badly infested with foul brood three or four years ago, through inspection the disease has been practically wiped out. There still exists a little of the disease in a few apiaries, but bee-keepers in general understand the treatment required so well we hope foul brood will soon be a thing of the past.

Division No. 8: U. H. Bowen, Niagara Falls.

Bee-keeping in this district has about recovered from the effects of the succession of poor seasons during which many small apiaries and some large ones were wiped out, because the owners, becoming discouraged neglected to give their bees proper care. Those apiarists, who, notwithstanding crop failures and small returns, kept their colonies in good condition, have had their reward. Two years of good crops and good prices have made the outlook much brighter. There is comparatively little disease, a large part of the district being entirely free from foul brood. In Welland County, near the town of Thorold, several small apiaries have been destroyed by some, as yet, unknown cause. The bees died after the clover harvest, dwindling away until none were left. The Provincial Apiarist, who examined some of the dead and dying colonies, pronounced them free from foul brood. It is the general opinion, although it has yet to be proven correct, that the trouble is caused by the poisonous fumes from a smelter recently built in that neighborhood for refining silver ores from Cobalt. This is a matter that should be thoroughly investigated, as the bee-keeping industry in Thorold township appears to have received a death blow.

Division No. 9: W. J. Craig, Brantford.

I beg to report bee-keeping conditions in this district as being very satisfactory the past season. An average honey crop has been secured and bees are in fairly good shape for going into winter quarters. A large amount of feeding has had to be done as brood chambers were left comparatively light in store. Where proper attention has been given to this we need scarcely fear for the wintering. We have held semi-annual meetings of our County Association and a district winter convention at Brantford. The latter was particularly successful.

Division No. 10: D. Chalmers, Poole.

I beg leave to report that I have communicated with a number of bee-keepers scattered over the district, and gather from reports received that in the northern part of Grey their bees were not in the best shape for a honey harvest, or their owners would have got a fair crop. In many parts of Perth County the same can be said of bees there, as there seemed to be considerable loss last winter. Many colonies that did winter over dwindled out in spring, and a good many survivors were weakened through being affected with dysentery, but those who had bees in good shape in Perth harvested an abundant crop. The latter part of June and early July were exceedingly dry and threatened a failure, but we were blessed with a three-inch fall of rain in the evening of July 10th, which changed conditions entirely. Reports from Bruce are good, but from the west and south of Huron they do not report so well. In some cases they report only a half crop.

As far as reports go on condition of bees for winter, they are in general all right.

Division No. 11: W. A. Chrysler, Chatham.

The bee-keeping industry in this district is progressing very favorably. Improved methods are being made use of in many cases, and an increased interest in bee-keeping is being taken. Many are anxious to increase their number of colonies.

The yield of honey per colony has not been large, yet giving a fair return for the labor. The demand for honey is good. Prices on the local markets are, on the whole, very fair. Owing to the increased number of bees kept in this district, the local market has been well supplied.

Division No. 12: Denis Nolan, Newton Robinson.

The season of 1909 in this district was quite favorable to the bee-keeper. The winter was not very severe; the greater part of the bees, being wintered out-doors, came through in good condition.

The spring was cold, wet and backward, the result being that the colonies did not build very rapidly, especially weak ones, so that the honey flow was on before all the colonies were of sufficient strength to store surplus.

Clover yielded well for a time, but was cut short in some localities owing to drought. Basswood yielded fairly well in some localities, in others little or nothing. A yield of 75 lbs. white honey was about the average, while upwards of 100 lbs. was also reported.

Buckwheat yielded much better than it usually does in this district. Honey found ready sale at the prices suggested by the Honey Crop Committee, a large portion of it going to the western provinces.

This district received very close inspection for Foul Brood during the year, but the disease seems to be more under control than formerly.

Mr. Herschiser moved, seconded by Mr. Holtermann, that the Ontario Bee-keepers' Association and the bee-keepers of Ontario and Canada generally, extend an invitation to the National Bee-keepers' Association to hold their next Annual Meeting in Toronto. Carried.

REPORT OF TRANSPORTATION COMMITTEE.

By J. D. Evans, Islington.

The only matter of importance that came up during the year was that in reference to the express rate on extracted honey in cans. It was found that maple syrup, milk, cream, and other fruit and dairy products were being carried by the express companies under what is known as the "special merchandise" rate. This calls for a reduction of about 25 per cent. on the rates for the general merchandise class, under which extracted honey is at present carried.

The two express companies were communicated with, and asked to place honey in the same classification as these other products. The Canadian Express Company through their Vice-President replied that they could see no comparison between these products and refused the application. The Dominion Express Company replied that in 1908 they had under their new classification given honey the same rate as milk, cream, and maple syrup, etc. This classification, however, owing to some irregularity was cancelled by the Dominion Railway Commission. If the Commission were favorable, the Dominion Express Company officials would give extracted honey the same rates as the other products mentioned.

The secretary of the Board of Railway Commissioners was communicated with and a formal application made to the Board that extracted honey in cans be placed in the special merchandise class. A reply was received from the secretary of the Board stating that the express classifications were under consideration at the present time, and that until some definite announcement was made he could not give any direct answer to our application. The matter therefore rests in that position at the present time.

RESIGNATION OF MR. M. EMIGH.

Moved by M. B. Holmes, seconded by W. Couse, "That whereas the Ontario Bee-keepers have for a number of years enjoyed the services of a most faithful and painstaking official in the person of Mr. M. Emigh, of Holbrook, and whereas he has during all these years not only given perfect satisfaction as Treasurer of this Association, but has in addition become a friend beloved by every individual member of this Association; and whereas he has concluded to resign his position as Treasurer and has tendered his resignation in fact; Therefore, be it resolved that we, as an Association, in convention assembled, as we stand at the parting of the ways in this particular, give expression of our regret that Mr. Emigh has found it necessary to take this action, coupled with the hope that we may enjoy his presence for many years to come in our annual conventions, and further that the best thanks of this Association be tendered our esteemed friend, Mr. Emigh, for his many kindnesses, excellencies of person manifested and general assistance so cheerfully rendered during all these years."

The Vice-President put the motion, which was carried unanimously, with applause.

Mr. Emigh: I assure you I appreciate this vote of thanks, although I do not really know that I deserve any vote. I have been paid a small salary for what I have done, and to get that and to get a vote of thanks thrown in, why, it seems something extra. But I don't expect to leave you entirely. I hope to be with you for many more meetings. I am pleased to say that our meetings are much better than they used to be, so much more interesting, so much more beneficial to the bee-keepers; and I trust that the Association will keep on in that direction.

ELECTION OF OFFICERS.

The election of officers then took place and resulted as given on page 4.

THE IMPORTANCE OF RE-QUEENING.

By H. G. Sibbald, Claude.

A number of years ago I had an experience with feeding back to finish up comb honey. I produced a lot of comb honey and always had a number of unfinished sections, and I would put two or three cases of sections on to a colony and feed back to have them completed. I noticed then that as soon as a colony got the swarming fever the bees would not take any more feed down or build any more comb. I have noticed more and more ever since that just as soon as a queen begins to slacken up in her laying that the colonies will slacken up in their working energy, and a queenless colony will not work equal to a colony having a good laying queen. This led me to observe from time to time the difference between a colony with a good queen and a colony with a poor queen, or a queenless colony. I think there is half as much difference in the work accomplished by a poor queen in the hive. Later on when I had occasion to go around amongst the bee-keepers and farmers I again noticed the degenerate stock that there was throughout the country. All these things have led me to place a good deal of importance on the subject of queen rearing and requeening.

There are very few bee-keepers outside of some that attend our conventions, that pay any special attention to their queens. A great many bee-keepers never had a queen cage.

Winter losses are from several causes. I think perhaps half as much loss comes from poor queens or queenless colonies and those that have drone layers, and they come out in the spring and you know the result; they are very little use. Winter them as well as you like, and you are one colony less. In wintering, a colony that is queenless will not winter well, or one that has a poor queen. They know there is something wrong, and they will try to supersede right in the cellar, and in outside wintering I haven't any doubt they will do the same.

As we run bees in a large way and keep them going for all they are worth, a queen does not last so long. Mr. Pettit pointed that out. If we have an early flow of white honey only, the queen lasts longer than if we have a fall flow.

I think that re-queening is one of the most important things bee-keepers have to consider. The queen end of the bee business is more neglected by the general bee-keeper than any other part of the business.

Every bee-keeper should learn to produce queens for himself. It is all right to buy queens to improve your stock. At any time you notice a failing queen she should be immediately changed for a good laying queen.

The next important thing is the strain. There is very little use in changing a queen unless you make some improvement. It is a very good trade to trade off an old queen for a young one. It would not be a very bad thing to do every year. You could afford to pay quite a bit of difference on the bargain. A young queen is worth a good deal more than an old queen, and is not so liable to fail. Some advocate raising queens from swarming colonies and natural queen cells, and so on. The great objection I would have to that is that in raising our queens from swarming colonies we are encouraging the swarming propensity, and in a large apiary, or for a man that has more apiaries than one, the swarming tendency is a very big fault; and even a small bee-keeper can get far better results if he can keep his bees from swarming altogether and keep them working right along. I would never advise anyone raising queens from cells that were raised under the swarming impulse. As far as I know this year we did not keep a cell that was raised under the swarming impulse. We raised all our queens from colonies that did not swarm. We are trying to breed out, and I think we will succeed to a great extent in breeding out the swarming tendency, and that will be a great help to us. When you have a large apiary it is impossible to have the outfit to let them increase to such an extent. If we have any natural queen cells we destroy them.

The opinion of most bee-keepers that have experience with the different diseases is that Italian bees are better than any other bees to fight off disease, and that has been my experience. The working quality is the important quality in any strain. If a colony will not work well and gather lots of nectar it doesn't matter what strain they are, they are no use. It is honey we are after. We should select for our breeding stock a strain of bees that are good workers. We cannot get this always when we are buying. It is not advisable to get all your queens from one man. I would always advise anyone in buying new stock to breed from queens bought the first season; test them well first and notice what they are going to do. I have heard lots of people express themselves that they would have given $100 if they had not got a certain strain into their yards. Do not encourage new strains until you find out they are better than, or as good as you have anyway.

On red clover this year we found some bees that would store a surplus and other colonies that were equally as strong did not seem to gain a bit. Some colonies actually filled a super of red clover honey. The strains of bees are different in their ability to get at the clover. As far as buckwheat honey is concerned, the blacks were just as good, if not better, than the Italians. It is a comfort to be able to handle a colony of bees without too much punishment. If we have neighbors it is a good thing to have bees that are quiet. If we can get a strain that can work well and have the virtue of being reasonably quiet, I would encourage that quality in my yard. I think you can get those that will mind their own business and work

Then as to the prolific queen. Some people prize that greatly. That to me is a fourth or fifth point. You have a colony that is prolific, that is a joy to you but as soon as the clover comes out they will sulk and will not work, and another colony that was not nearly so prolific gets away ahead of them when it comes to getting honey into the super. I look for the other qualities first, and then a good laying queen is always in order. I have inspected yards where there might be 20 colonies of bees, and out of the twenty you could hardly find ten that had queens that were doing anything like they should do, and there was a failure on account of having poor old queens.

Every year when we clip our queens we mark the date on the hive with pencil so that it won't come off until that queen gets out of there. If we clip queen this year we mark "C" for clip and "9" after it. If we come to a queen tha

has been clipped we just mark "C" on that hive. In that way we can always tell if the queen had been raised previous to last season, and all those queens with "C" on must be changed this season. Those queens with "C. 9" on, we might not change at all. If we find a colony doing good work and putting up lots of honey, and we think they are a valuable strain, we like to keep them because we think we gain a little point in drones that might be produced from that colony, and they will have a good influence over the breeding in the yard the next season.

I think every bee-keeper should have in an apiary of 100 colonies, 15 nuclei. By re-queening as you notice the queen failing you do not have all your work to do after the season. There is no robbing going on; you can find your old queen very easily because all the bees are out in the field, and they accept a queen readily, and everything goes like clock-work.

Mr. Ross: What would be the objection to slipping in a cell protector and putting them in immediately?

Mr. Sibbald: That is practiced by queen breeders, and I thought that would be a good plan, although I have never used the cell protectors. You are generally in the yard one day a week. This season we repeatedly took cells from one yard to another with us in the rig and used them in the nuclei there. Mr. Adams, I think, advocated grafting the cells into full colonies, but with my work in three large yards, I have found that I would prefer to have them mated in nuclei, and when I could see they were laying and in good condition, then I would introduce them. Putting them into full colonies they sometimes get lost, sometimes mismated and sometimes are not what you would like afterwards, and you have the trouble of hunting them up in the full colonies and re-queening. I would not care to have colonies queenless the ten days it takes the queen to mate and start laying. I think it is important to have a laying queen in the hive every day. In running out-apiaries, when you are not there all the time, if you put cells in in that way they will start cells all through the hive, and you have to hunt them out. By putting in a good laying queen you will not have that trouble. I have been quite successful in transferring them from nuclei to full colonies without much loss. Queen rearing does not give me any particular trouble. It is a pleasure; it is a rest; I like to get an hour or so to attend to them.

The best way I know of for making those nuclei is to take up two combs of brood into the top storey and fill in the spaces below with full sheets. Then in a week's time you can take that brood out, and the bees adhering to it, and start two nuclei, using a division board or a small hive like Mr. Adams had here to-day, and put in your cell shortly afterwards and everything will go all right.

In introducing queens we usually put them on top or down between the frames. A plan that works very nicely through the season when gathering honey is to catch the old queen and put her in a cage, and then put the queen you wish to introduce into the colony after a little while, when they begin to realize their queen is gone; then afterwards change the two queens, take the old queen out and put the young queen into the cage that the old queen occupied, because it has the scent of the old queen. If the old queen is to be killed, rub her body over the cage. In finding queens I do not know of any particular way, only to go at it and go over the hives. You must not smoke them very much, you must not get the bees running, you must not excite them; be gentle about all your manipulation. The better time to find them is in the daytime when the bees are out in the field.

Another plan, if you ever get stuck, is take an empty hive and transfer the combs as you look them over into the other hive, and perhaps you will find the queen on the bottom or some place. You are sure to find the queen that way.

Mr. Dickenson: That is the proper way to do it anyway.

Mr. Sibbald: No, I would not think of doing that until I had looked through the hive.

Mr. Dine, New York: If I was going to re-queen my yard I would not start nuclei. I would go to a swarm that I wanted to raise the queens from, and draw out some of the brood sealed over, and insert empty combs so that the queen could fill them. Two days afterwards I would go to another swarm and get that in shape, and take these two frames and put in just the egg and let the bees raise it from that. When these queen cells had got in proper shape in about twelve days I would take those queen cells out and put them in protectors on the colonies I wanted to introduce these queens to. Catch the old queen, and at the same time put the queen cell in the protector. I would do away with all the nucleus business, and I do not think the loss would be any greater from flight among those young queens from the whole colony than it would to raise the queens in nuclei and introduce them into the colony.

Mr. Holtermann: I would like to uphold Mr. Sibbald about this red clover queen business. I found just exactly what Mr. Sibbald found this year, that there were certain colonies—and let me say at once I have not had time to keep track of what they are so that I would not be able to supply any queens from that stock, and I do not breed queens anyway—I had a percentage of colonies that gathered a considerable amount of red clover honey when others gathered nothing at all.

Mr. Sibbald spoke of the prolificness of the queen, putting that third or fourth. I admit that there is a difference in traits, but give me the colony that has the bees, and in nearly every case you will get the honey.

Mr. Sibbald spoke of the importance of always having a laying queen in the hive. I emphasize that as strongly as he does. The advantage of a prolific queen is that she continues to occupy that brood chamber with brood and does not allow the crowding out of the honey; and if the queen is not prolific there is a constant decrease in the capacity of that brood chamber. It becomes practically a honey super. Mr. Sibbald said he was seeking to eradicate the swarming impulse by not taking the cells raised under the swarming impulse. That interested me very much.

Mr. Hurley: My idea of discussing this question is entirely the discussion of re-queening, its advantages over the old-fashioned way of leaving your queen in the hive for two or three years. I consider the advantages of re-queening annually are very great to the bee-keeper, whether he be experienced or non-experienced. I suppose my remarks would be altogether uncalled for to those who are experienced men, but of course we must always consider we are speaking to a certain number of graduates who are constantly joining our ranks. It is very largely for their benefit we discuss these problems. I would say that the bee-keeper's year ends with the close of the white honey flow; taking that as our starting point, I consider that his work after that is preparatory for the coming year. Therefore, if that be the case, I would say that his best policy is to immediately re-queen at the end of the white honey flow. If he does, he puts his hive in the possession of a new, young and vigorous queen that will give him a young, active, vigorous lot of bees to go into winter quarters. They will also be effective for gathering a fall flow if he has one. But, the prime point to this is that he has a new queen put in his hive immediately after the close of the white honey. That is one of the first necessities for good wintering. Having your good stock for winter, I will assume that you know how to winter your bees. That is no part

of our present discussion. You have a minimum of chances that you are going to lose your queen during the winter because she is a new, young and vigorous queen, and the probabilities are she will come through the winter more successfully than if she were an old queen.

Having come through your winter you enter into your spring work. As you enter into it you have also the assurance and the further satisfaction that you have a young and vigorous queen in your hive. You know that other things being equal she is going to be able to stock that hive well with young bees, and you are going to come into your summer flow with a good hive full of bees. At the end of the honey flow you have done with that queen, you have exhausted her, and you will renew her again, and so the process will go on. That to my mind is the philosophy and utility of re-queening.

Mr. Anguish: As Mr. Sibbald said in his outline, this is one of the most important things to the bee-keeper. I say it is *the* most important thing in bee-keeping, that is looking after your queens. As soon as the honey flow is about at a close I re-queen my yard all over as much as I can, but not to kill everything off; that is going a little too far. You have got some colonies in that yard that have given you some great results that year. What are you keeping them for? Those are the ones I want to breed from next year. I want to get some queens from that colony and raise queens from them. That is where we get our bread and butter, from the good stock of bees we have got. We all know that queens vary, and they vary sometimes in seasons too. Take one season, a queen will do extra well; she will not do as well the next, but you can raise good queens from that one.

Mr. Ross: I was very glad to hear Mr. Sibbald say he enjoyed looking for queens. I am so situated that I have to get to work at my bees early in the morning or after 6.30 at night, at both of which times the hives are packed with bees, and I have experienced a good deal of difficulty in finding queens at that time. Can anybody give me some scheme whereby I can get those old queens to supersede without too much difficulty?

Mr. McEvoy: As a rule about six o'clock in the morning the queens are on the first three frames in the centre, and they go in a circle around. They are at one side or the other at six o'clock in the evening. I want plenty of bees. I could not agree with Mr. Sibbald in that.

Mr. Sibbald: I meant you should not choose to breed from the most prolific queen you had just because she was prolific.

Mr. McEvoy: That depends on the training you give these bees. You can get the work out of these bees if you set them to work right, and the more bees there are the better. Mr. Dine took a short cut that was well worth paying attention to. I have practiced the same thing. I like it first-rate. I will get more profit out of young queens than old ones. Someone will say, I have had queens to do so and so at such and such an age. Yes; you can get good men at 70, but you can get more good men at 40.

Mr. Dine: I am a firm believer in re-queening, but we are taught that a queen lives from three to four years. Is it possible for a queen to get to her best in ten or twelve months? If I had a queen that laid a comb full of eggs do you think I would change her the first year? No, I would keep her for two years or more. I go, personally, more by the looks of a queen. As long as she is bright and yellow and filling the combs full I would keep her till she showed more signs of failing.

Mr. McEvoy: That will all depend upon the work you take out of that queen. You keep her confined to the brood chamber only; you raise no brood to the super?

Mr. Dine: That queen will wear out in two or three years in that way.

Mr. Herschiser: The question resolves itself to this: Do away with all your poor queens and keep your good ones. Mr. Ross wanted to know how to find a queen, and there are several ways of doing it. I would like to call your attention to one or two: By taking the frames out one by one and shaking the bees off at a considerable distance, stringing them along on a sheet if you please, and getting them to run in, and if you watch them at the entrance you will soon find the queen. Another way is to put a queen excluder over the hive and shake the bees down, and as they run through it will strain the queen out, and you will find her on top of the queen excluder.

THE USE OF THE GASOLINE ENGINE AROUND THE APIARY.

By D. Nolan, Newton Robinson.

The subject on the programme is "The Use of the Gasoline Engine around the Apiary." Perhaps that would look better if we would say "to the bee-keeper." He need not be using it around the apiary all the time. There is a great deal of prejudice against the use of gasoline engines. I attribute that mainly to the make-up of the engines in earlier days. I think it is a mistake to confound the engine of to-day with the one of some years ago. They have them perfected and improved so that the trouble is almost a thing of the past. I cannot see any reason why any person should hesitate for a moment. The use of the engine of course to the bee-keeper is simply a means of saving labor. I often compare bee-keeping with other pursuits, and it strikes me we have not as many means for saving labor as they have in other lines. I think the farmer is a little ahead of the bee-keeper in this. I think the farmer does at least twice as much or more work to-day than in the past, with the same amount of labor. The use of the gasoline engine or any kind of chemical engine in the country, is of very great importance because they are always ready and handy, and you can have a light one or heavy one, whichever your occasion demands. You do not need to spend half a day getting up steam before you are ready to use it. They are ready to use in half a minute's time. The main use of the engine to the bee-keeper of course is for extracting purposes, to drive the extractor. That is mainly why I got mine. At the present time I can say it is past the experimental stage with me, and it has come to stay. The engine I use is an air-cooled, one-horsepower engine, and weighs about 196 pounds; there is no cumbersome water tank, and I can put it on a wheelbarrow or take it into a light run-about waggon to the out-yard and put it in the honey house and have it running in a very short time. The extractors I use are the ones I had before I got the engine, and in trying it I simply tried it on those extractors. I had three four-frame extractors. I got one first, and I liked it so well that I got one for each of my yards. They are cumbersome to move so I arranged my engine to work on those extractors. They are four-frame reversible extractors made by the Brantford people, all of the same style. The only difficulty I see in those extractors and others is that the motion has to be reversed, and you must have a connection be-

tween the engine and extractor that will reverse the motion to turn the extractor one way and stop it and reverse it and work the other way. It worked very nicely last season, and this summer I thought to make a little improvement, and the result was I broke a casting on the engine just about the time I was busiest, and not being able to make out the number on the engine of the piece, I was unable to use that engine for about a week. I had to employ a man to turn the extractor or else turn it myself, and I never appreciated the engine so much as I did in those warm days when it would not go. After I got that piece and got it started I appreciated it very much more than I ever did before. The engine will do the same amount of work as a man for fifteen or twenty cents a day, and from a financial point of view it is certainly a paying investment. I have extracted something over 30,000 pounds with mine since I got it, and I think with the extracting and other work I have done with it the engine really does not owe me anything.

I did not have an opportunity of testing the different makes of engines of that size. Around through the country you will find amongst the farmers all sizes and makes of engines. I will say I never lost more than two hours' time trying to get it to go, and that was not really the engine's fault, it was the fault of the batteries. If your batteries are good and your gasoline is good there is no reason why you should have any delay in making your engine go satisfactorily.

In regard to the use of the engine for other purposes besides extracting, while it is only a one-horse power engine you may think it is not of very much use, but nearly every bee-keeper has a horse or cow, and you know what a task it is if you are going to feed a little cut feed. I take the engine out to the barn and cut the feed. Another use, we had a Barnes foot and hand power saw; out in the country we have a certain amount of work like that to do, and I make my own boxes. I buy the lumber there and get it re-sawed, and get my boxes at a very small price. This can be done in the winter time, and in that way you can use up your spare time to advantage. You put one of those one-horsepower engines on one of those saws, and you have a perfect machine. Lots of people say to me, who made those boxes for you? I am not a mechanic, but I have made hives and sold them, and ripped out supers and have done the work myself. While I have had that done at the planing factories at home, I feel safe in saying the way I did it was done to my satisfaction. You generally have to get them from the supply dealer. Another use I put it to is to cut cordwood by putting the engine on to a circular saw.

PRESENTATION TO MR. WM. McEVOY.

Mr. Holmes called Mr. McEvoy to the front and presented him with a purse of money and read the following address:

Dear Friend McEvoy:—The beekeepers of the Province of Ontario, and the members of this Association in particular, who feel themselves under great obligation to you for the magnificent services rendered through your discovery of a simple and effective remedy for the cure of foul brood, desire to take this opportunity of expressing their appreciation of your inestimable services, and as a token of regard, beg you to accept the accompanying purse. We consider it but a small return for what your skill and inventive genius have done for us.

To give you an approximate estimate of the benefits resulting to kee-keeping in this particular would be quite impossible, as it will continue to be a benefit so long as time and circumstances endure. You have made the name of Canada famous throughout the world by your apicultural triumph. This is the first opportunity we have had of meeting you since your retirement from inspectoral work and we cannot allow it to pass without going on record in testimony of the great service you have rendered us and the bee-keeping fraternity throughout the world.

We beg to impress upon you that we are not unmindful of the great pecuniary sacrifices you have made in our interests, and take this means to at least express to you our gratification and admiration.

We trust that you may long be spared to continue your work with the bees, taking comfort in the thought that your altruistic motives have been recognized and appreciated, not only by your associates, but by the bee-keeping world at large.

Mr. McEvoy, in accepting the presentation, expressed his appreciation and stated that it had come to him with the greatest surprise, as he had not expected anything, and he was very thankful to one and all; that when he had accepted the appointment of foul brood inspector some nineteen years ago it had been with diffidence; he felt that he was not capable of filling the position and did not feel that he could afford to give the time to it; that during the nineteen years of his inspectorship he had never had a case in court. He wished to say once again that he was very thankful for and appreciated very much the honor which had been done him in making this presentation to him.

THE PROVINCIAL APIARIST.

The President called for suggestions from the members with reference to experiments that might be made by the Provincial Apiarist; he thought it would be very beneficial all around and would be helpful.

Mr. Holtermann: I believe a proper work for this Department would be to seek to see if anything could be done in the way of controlling the fertilization of the queen. In my estimation the experiment station should be equipped with facilities for inside wintering, where ventilation, temperature and humidity can be absolutely controlled; I am desirous of seeing a station that is the very best in the world.

Mr. Pettit: I have this matter of the control of the mating of queens in mind. It is of prime importance that we learn to control it so that we can breed certain strains. So far I believe it has really not been successfully controlled. Some comparative success has been reported. I understand Mendel, who has done so much for research in heredity, conducted extensive experiments along this line. We do not know how successful he was because all of his notes on bees unfortunately have been lost.

As to wintering, steps are being taken to carry out these experiments. The main obstacle is the matter of sufficient equipment, and it will take a little time to get the expensive equipment necessary to conduct these experiments in a really scientific way.

Mr. Evans: It has occurred to me if the experimenters could get control of a large greenhouse and get some hives in it, and get the bees accustomed to staying there, and then try experiments with queen mating, they might succeed. I think it is important we should also get some data as to the proper temperature for keeping bees in the winter. I am of the opinion we keep them too hot. Mr. Davidson keeps his bees almost at freezing point, and he is one of the most successful bee-keepers we have.

Mr. Sibbald: My idea with the experiment station would be to get at things that will not cost too much at first. There are many little practical things that the different bee-keepers who keep a lot of bees really cannot understand. There is the question of wintering bees, the temperature and the ventilation of cellars; then wintering outside, as to whether you should have packing underneath or whether there should be one or two or three inches around the side or on top, etc.

Yesterday it was brought up as to whether queens artificially raised or grafted are as good as natural queens. I can think of any amount of other little things that bother us more or less to just give an answer as to which is best, and as it comes to be recognized that these things are appreciated and important and telling in the bee-keeping industry, there will not be so much trouble getting more money to try these more elaborate experiments.

MR. HOLTERMANN: To put packing or no packing under a hive, to set a group here and there, you will find some that have wintered well and some poorly in each. Supposing those experiments were conducted, I do not see that we are going to gain so very much, but what in my estimation we want to do is to test principles and go behind them, and we want to get the necessary funds to do that rather than go into the minor details in the matter.

MR. PETTIT: It seems to me that Mr. Holtermann's suggestions are more along the right line. The point I see is to get at fundamental principles. Take this matter of the temperature of cellars, we are all testing that. I know men who have wintered successfully at a temperature of 35 degrees; others claim to winter as successfully at 45 degrees to 50 degrees. There are so many other conditions that come in in connection with the management that it requires a very complete equipment, and unless you have a rather expensive cellar arrangement you do not know that you are controlling the temperature, ventilation, and humidity.

MR. ED. DICKENSON, N. Glanford: I think the locality will have to be considered. Let the men who are thinking of going into the wintering problem use whichever method they think best and find out the same as the rest of us. I do not think you could put down any hard and fast rule for outdoor wintering.

MR. TIMBERS: 90 per cent. of the bee-keepers throughout the Province have to use the cellars they have.

MR. DICKSON: The experiment station is all right, but the question of experiments on wintering I doubt. There are many little things in which the experiment station will be a help to beginners and save them many dollars. On the question of wintering, unless it is an outside cellar it will cost a great deal. I certainly would not advise an experiment station for wintering, for the simple reason locality has everything to do with it.

MR. CHRYSLER: I think the Station should take up the question of capping melters or some plan for treating cappings.

MR. PETTIT: We are working on that now.

MR. CHRYSLER: I think apparatus for assisting the progressive bee-keepers and lessening the work and labor in the production of honey would be a good thing.

MR. TIMBERS: I think it would be more beneficial to the general bee-keeper to experiment along the lines suggested by Mr. Chrysler.

MR. ARMSTRONG: I rather like that suggestion of Mr. Chrysler's. I think that would strike nearly every bee-keeper. Mr. Pettit and I were talking about the apparatus necessary to run a yard all the way through, power outfit and extractors and capping melters, and all things along that line. If such things were all tested at the Station every bee-keeper all over the country would not be trying them.

MR. HOUSE: Where would we be to-day if it were not for science? If you can get an experimental station, it will do something in a scientific way to uplift your industry.

Mr. Clark: It seems to me the question of disseminating information would be a good thing; that is, to issue a pamphlet giving the best method of producing comb and extracting honey and everything that goes to successful apiculture, and send those pamphlets to every man that can learn how to keep bees. It may be a means of making better bee-keepers of those who are now a detriment to the industry.

Mr. Hodgetts: Mr. Pettit is already working on that suggestion. I feel that outside of probably some of the text books we have nothing in the Province we can send to the bee-keeper. A lot of men starting in bee-keeping want a good, practical hand-book, and we have nothing to give them, so I have asked Mr. Pettit to prepare something this winter for our reports. Mr. Pettit can get all such information together, and tell the men how to winter outside and inside. Mr. Clark's suggestion I think is a very good one, and we will have something I expect by spring to distribute.

In regard to the scientific or practical side of the work, our College at Guelph has to be practical. At the same time, they are doing very good scientific work, and there is no doubt that Mr. Pettit can follow such lines, and we can get good results from both. We have endeavored to make all the experimental work at the College first of all practical, so that our bee-keepers, or men in other lines, can come there and see what is being done, and can be done on the farm. In regard to the experimental work in connection with roots and field crops, there are thousands of visitors who go there every summer and see the results of the professors' work, and there is no doubt it has resulted in bringing millions of dollars into the pockets of the farmers of this country. Mr. Pettit has a tremendous field for working along scientific lines, and I am hoping he will be able to combine the two.

The following motion was then carried:

"That the Members of the Ontario Bee-Keepers' Association view with alarm the fact that cases of European foul brood have been found among bees in Ontario; that we desire to place ourselves on record as, 1st, strongly favorable to action on the part of the Government, which shall, by thorough and careful inspection, locate every hive affected; 2nd, That the Provincial Government take any action necessary which shall enable it to secure complete control of affected colonies, destroying them."

It was also moved and carried that the Executive, in connection with Mr. Pettit and Mr. Sibbald, be a Committee to re-draft sec. 4 of the Foul Brood Act, and that they have full power to act in the matter.

QUEEN REARING.

By P. J. Clark, Borodino, N.Y.

I think you will all agree with me that there is nothing that the apiary depends more upon than a good queen. Give me a good queen, one that can be brought up to the highest egg production at the time I want it, and I will assure you a crop of honey, but with a poor queen that you have to coax for eggs, the flowers often bloom in vain.

My object in coming here is not to give you a scientific lecture on queen rearing, because you can all read that in the books for several books have been written by eminent authors. But what I want to do is to take you by the arm and lead

you around through the apiary and show you the practical work of queen rearing, and the implements and tools, and just how it is done. I understand how you may read about all this and partially understand it, but some way or other the people want to see the picture, to see it demonstrated—a sort of kindergarten as it were. From the consensus of opinion yesterday I am well satisfied that a great many of you are dissatisfied with the queens you are buying from queen rearers, and therefore I want to teach you how to raise them yourselves, and see if you are more satisfied. You probably will be. With that idea I have brought up my queen rearing paraphernalia, and I will proceed with a practical demonstration of queen rearing.

After we take bees out of the cellar in the spring, just about the 1st of April on an average, the first thing we do is to select three or four or half-a-dozen of the strongest colonies and endeavor to build them up as fast as we can by giving them brood from other colonies. The hive we use is a ten-frame movable hive, and when we get the colony up so that we think it has young bees sufficient to start brood rearing and raise queens we take a ten-frame hive and divide it off with a queen excluder. The first thing to do is to make queen cells. We make those in the winter. I do not believe there is one out of ten here who knows exactly how to go to work and make them right. I use a common rake tooth for dipping. They will accept these cells as well as anything else. The rake tooth is made of hardwood. The first thing you do is to have a little stick notched so that the tooth lays right in the notches. You wet this rake tooth in water for half an hour so that the wax will clean off. Mr. Doolittle, on measuring natural queen cells, found they were about half an inch deep, and therefore he cut a notch on the stick 9-16 of an inch from the end, which makes the first dipping about that length. After being wet you put it into melted wax up to that notch the first dip. You give it about three dips. The next dip not quite as deep, and the third one not quite as deep as that. Then place it on the stick. Then take another tooth and do it the same way. Twist it around and have the wax round at the bottom so as to make the bottom thicker than any other part of it, and that protects the cells when you handle them. You put about six of those teeth through in that way. Once done, you twist it off when you want to put it on the cell bar. Here is a cell bar, and I put sixteen cells on that. After the sticks are prepared we go to the queen breeder and take up a comb. Select larvæ as near as you can from 24 to 36 hours old, preferably 30 hours. To tell that, a beginner should put a laying queen into a hive of empty combs, and she will lay immediately, and then he can tell age. They hatch in three days, and by the size of the larva when it is 24 hours old he can tell. When it is 24 hours old it is about in the shape of the letter "C." When you select a comb and find a piece with larvæ about the right age, you cut a piece out. In order to get at the larvæ easily, you shave off the cells with a knife down to about 1-10 of an inch.

In the spring we have to make a colony queenless in order to get royal jelly. We take a cell of royal jelly when it is about three to four days old, and dilute it somewhat with saliva. Take a small stick and stir it up with an ear spoon till you get it uniform, then take that ear spoon and dip out about the size of a double B shot and place it right in the queen cell. Go along and do each one till you go across the whole bar of cells. The object of putting royal jelly in there is to give the larvæ something to feed on. Take a common goose quill and dip right under the larvæ, lift it up, place it in the cell, and that royal jelly being in it will remove it from the quill when you push it away from it.

After I have gone across the whole lot of cells I put it up to the window so that the light will strike across it, and you can see every one, and if you have skipped one you can put it in. For that row of sixteen cells, one good cell of jelly three or four days old will be enough to supply them. The only object of putting the jelly in is to facilitate placing the larvæ in there, and to keep the larvæ feeding while you are transferring it. You want to be careful and not get your royal jelly too thin, or your larvæ will float out.

Before we have the colonies strong enough to make two hives, I use the excluder, and I have four combs removed from the side. The farther comb I put full of honey on the extreme outside. The next is the comb of open brood, and the next comb is spaced to insert the cells; and next would be a comb of sealed brood, and the remaining combs on the other side of the partition you place unsealed larvæ up next to that, and place honey on the extreme outside. You space these combs the night before if possible, and that space will fill with bees. The next morning put in the prepared cells.

Mr. Sibbald: Is that a queenless colony?

Mr. Clark: No, keep the queen in the compartment on the other side away from the prepared cells. You cannot rear queen cells unless you have got strong colonies and plenty of young bees. This is the first step in rearing queens in the spring—about the latter part of May. I have had them draw out the whole sixteen. Later on when the colonies get still more populous you put a queen excluder across the hive and place another hive on top, keep the queen below and move the brood above, and then give them additional brood from another hive, filling the top storey full of them. Then place your row of cells you have prepared in the top super and brood on each side. I have had four or five of these frames going at once, and by the eighth day you go down below and get some open brood. You want open brood all the time in where these queen cells are. This is in the swarming season when you people want to raise queens.

Mr. Galbraith: Do you ever cut the mouth of the cell, providing there is one not so amply fed as the others are, so that they will put the jelly in there?

Mr. Clark: No, I destroy it; I don't take any chance. You will have no more trouble in rearing queens from Italians than from the black races; they will rear just as good, and I do not know but better, because they do not start so many. To start your cells, they would be the better bees to use.

In order to melt your wax for cell cup making, take one of these one-wick little oil stoves. You want your wax just about the melting point all the time, and keep putting wax in.

After the cells are drawn out, we keep a record in this order: The date when the cell was made and inserted, the name of the queen from which the larvæ was taken, the row in your apiary on which your queen rearing hive is placed, the number of the hive, the number of cells that are inserted, the number that were accepted, the time they were put in during the day, when they are ripe or due to be transferred to nuclei. I keep that record in the office. After the tenth day we calculate to distribute these cells to nuclei. They won't hatch probably till about the tenth or twelfth day after grafting. As to their hatching, the season of the year and the weather makes a great deal of difference.

Mr. Timbers: Do you find queens that hatch in twenty days as good as those that hatch in fifteen?

MR. CLARK: I do not think so. The longer they wait in there the darker they get. We make a lot of nuclei frames, and in the spring I insert them into a lot of full colonies all around, right in the centre. When I want to make nuclei, I take sixteen of those boxes and go to the out-apiary, and generally in the spring I put queen excluders on as soon as the bees will stand it, and put a storey of empty combs on top so that they will go up and work in there, and it keeps the drones out, and when you go along you have a funnel that is oblong on top and will fit into this hole in the bottom. Set these boxes down on the ground, insert your funnel, and shake the bees, and you have a section placed in the box partly filled with honey for the bees to feed on. Shake them and they go in there without any trouble; and then go on with the next one till you fill the boxes all up. Then we take them home. We try to have virgins, but if virgins are not hatched we take ripe cells, due probably to hatch the next day, and insert them in cell protectors. There is a partition, and there is a five-eighth inch hole through there bored with a bit. Place that in the hive and it takes a twin nuclei. I take a frame of sealed brood, preferably out of the hive that I had these frames in, insert that frame of brood up next to the division board, then put on the frame of honey, and maybe that is all I put in to start with. As they prosper you can add combs, and they will draw them out. Seventy-two hours is about the ideal time the colony should be queenless before the queen emerges.

MR. HERSCHISER: You always introduce a virgin queen in the way you describe?

MR. CLARK: Yes. Here is the follow board. This will hold half a teacupful of honey. The object of that is in the fall queens are slow to be mated, and in fact they will not act at all unless you give them a little stimulus by feeding warm syrup in there along about 11 o'clock in the day. I do not think you will ever want to rear them as late as that. With all weak colonies I like to have the entrance away from the combs; they are not so apt to rob. Take a full big hive, and in making a nuclei you put the entrance away over on the other side as far as you can get it. About two queens a month is all we calculate to get out of a nucleus. They may hatch and be looking all right, and you may think you are going to have them, and about the thirteenth day you go around and look at them, because we wait for thirteen days, and then they are larvæ. By having larger nuclei they will maintain themselves. Sometimes if you take the queen away before the eggs are all hatched, they will destroy every egg and won't have any brood at all. In the fall we take four nuclei and we go along and remove this or that queen. As soon as these have been queenless three days you remove that button and they will gradually work through, and you never see any fighting among the bees.

I want to show you how you can re-queen every year and still not stop the workings of your hive and be at any extra trouble. About the middle of the honey flow, or just after it is over, it doesn't make any difference, I go along, and I have ripe cells. I go to my colony, and I take a frame of brood out of the centre. It has got to be just hatching. I insert the ripe queen cell in it. I take this zinc division board with a hole in it, and slip it down near the end of the hive. There is an entrance to the hive on the back. The bees are hatching out, and it is warm weather, and you have no trouble of the cell chilling or anything of that kind, and there you have a self-made nucleus and have not disturbed your hive at all.

MR. MILLER: That includes simply one frame behind that?

MR. CLARK: Yes. You can make it from two frames if you like.

MR. HOLTERMANN: You put that cell in immediately you make the division?

MR. CLARK: Yes.

MR. SIBBALD: That cell will have a protector on it?

MR. CLARK: Always put a protector on. You can go and look at that cell and see whether it is hatched or not, whereas, if you put it in on the comb and did not look at it for two or three days, it might have hatched, and they will destroy the cell and take it away; and it saves you the trouble of looking all through that colony to see whether you have got a virgin or not.

Another plan I have used. I have as many hives without bees in as I have with. You can place a nucleus with a frame or two in it right beside the hive any season you like, and let that queen work along and she will get quite a colony of bees, and when the time comes forward I want to re-queen, I kill the old queen and let the new queen go in. That necessitates an extra hive which you would not feel like having perhaps.

I like to re-queen every year. A pullet is better than an old hen.

One point I wanted to bring out, and that was about so many inferior queens being received, and they wonder if the queen breeder is not to blame. My theory is that queen breeders will go to the comb and take a laying queen; she is full of eggs, right in the height of her egg production; they will take her and put her in the cage with bees, and put her in the mail as soon as they can get her in; there she is loaded with eggs, and by the time she reaches her destination she is about ready to give up anyway, if she is not dead. Generally we take the queen and cage her the day before and leave her over night, and by morning she is reduced a third.

Just as the white honey flow is winding up we go to the colonies that we want to rear drones from. I have drone combs, and I insert them right in the centre, and in nine cases out of ten the queen lays in there all right. That is along about the first part of August. Then I leave it there till the most of it is sealed over, then take full colonies, as many as I want to prepare for queen rearing, and make them queenless, and put that brood in there and they will not destroy it as long as they have not got a queen. Let them rear a queen themselves, and as soon as she is hatched and raised, take her out. Then you have your own selection in the fall. In fact, you almost control mating in the fall in that way.

A committee of Messrs. Sibbald, Byer and Timbers, was appointed with instructions to ascertain the correct dimensions of a pail to hold either 5 lbs. or 10 lbs. net and gross.

ANNUAL REPORTS

OF THE

Dairymen's Associations

OF THE

PROVINCE OF ONTARIO

1909

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

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1910

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TORONTO.

To the Honourable JOHN MORISON GIBSON, K.C., LL.D., *etc., etc., etc.,*
Lieutenant-Governor of the Province of Ontario.

May it Please your Honour:

I have the pleasure to present herewith for the consideration of your Honour the Report of the Dairymen's Association of Western Ontario for 1909, and the Report of the Dairymen's Association of Eastern Ontario for 1909

Respectfully submitted,

JAMES S. DUFF,

Minister of Agriculture.

Toronto, 1910.

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DAIRYMEN'S ASSOCIATION OF EASTERN ONTARIO.

OFFICERS FOR 1910.

Hon. President—Senator D. Derbyshire, Brockville, Ont. } Both for life.
" J. R. Dargavel, Elgin, Ont. }
President—Henry Glendinning, Manilla, Ont.
1st Vice-President—J. H. Singleton, Smith's Falls, Ont.
2nd Vice-President—T. A. Thompson, Almonte, Ont.
Secretary—R. G. Murphy, Brockville, Ont.
Treasurer—J. R. Anderson, Mountain View, Ont.

Directors:

John H. Singleton, Smith's Falls.
Neil Fraser, Vankleek Hill.
Edward Kidd, North Gower.
W. H. Olmstead, Bearbrook.
John McGregor, Alexandria.
William Montgomery, Gravel Hill.
J. T. Payne, Brinston.
James A. Anderson, Oxford Station.
J. B. Wilson, Wilstead.
T. A. Thompson, Almonte.
Jos. McGrath, Mount Chesney.
Charles Anderson, Overton.
Alex. Hume, Menie.
G. A. Gillespie, Peterboro.
W. S. Blakeley, Cherry Valley.
Henry Glendinning, Manilla.
James Whitton, Wellman's Cors.

Auditors:

J. A. Kerr, Belleville; A. S. White, Sidney Crossing.

FINANCIAL STATEMENT FOR 1909.

Receipts.

Balance from 1908	$ 227 10	
Ontario Government Grant	1,666 00	
Leeds and Grenville Grant	200 00	
Town of Prescott Grant	100 00	
Membership fees	161 00	
Advertising in programme	175 00	
Money received from fines	1,207 34	
Miscellaneous	14 75	
Balance due Treasurer	65 81	
		$3,817 00

Expenditures.

Annual Convention:		
Expenses of officers and directors	$ 326 20	
Reporting convention	110 00	
Advertising	268 95	
Clerical assistance	28 95	
Miscellaneous	100 00	
		$ 834 10
Executive Meetings:		
Expenses of officers and directors	$ 443 80	
		$ 443 80
District Meetings:		
Services and expenses	$ 179 80	
Advertising	165 50	
Rent of halls	47 25	
		$ 392 55
Salaries and expenses of officers (secretary $300, treasurer $100) and office assistance	$ 458 50	
Printing, postage, stationery, etc.	76 35	
Inspectors' services and expenses	1,398 30	
Auditors' fees and expenses	48 75	
Bank charges	51 95	
Farm and dairy membership	112 70	
		$2,146 55
		$3,817 00

DAIRYMEN'S ASSOCIATION OF WESTERN ONTARIO

OFFICERS FOR 1910.

President—Jno. H. Scott, Exeter.
1st Vice-President—Wm. Waddell, Kerwood.
2nd Vice-President—D. A. Dempsey, Stratford.
3rd Vice-President—S. R. Wallace, Burgessville.
Secretary-Treasurer—Frank Herns, London.

Directors:

J. N. Paget, Canboro.
W. S. Stocks, Britton.
J. B. Smith, Alton.
Geo. M. McKenzie, Ingersoll.
S. E. Facey, Harrietsville.
J. J. Parsons, Jarvis.

Auditors:

J. A. Nelles, London.
J. C. Hegler, Ingersoll.

Representatives:

Canadian National Exhibition, Toronto—Robt. Johnston, Woodstock.
Western Fair, London—I. W. Steinhoff, Stratford.

FINANCIAL STATEMENT FOR 1909.

Receipts.

Cash on hand from previous report	$ 867 84
Members' fees	329 00
Legislative grant	1,666 00
Money received from prosecutions	912 50
Sale of exhibits	1,596 89
Advertising in programme	120 00
Loan	590 00
Donation	5 00
	$6,087 23

Expenditures.

Cash paid for prizes	$ 440 00
Expenses for conventions or regular meetings	170 04
Stenographer's salary, $440.00; directors' fees and expenses, $197.25	637 25
Postage and stationery, $112.65; printing, $179.88; advertising, $20.70	313 23
Judges' fees and expenses, $49.05; lecturers' expenses, $196.30	245 35
Inspectors' salaries, $361.00; other expenses of Inspectors, $256.80	617 80
Periodicals for members	214 41
Cost of reporting	75 00
Refund to members, $2.00; office furniture, $7.45	9 45
Purchase of exhibits	1,616 09
Office light, cleaning, sundries	79 46
Office rent $120.00; auditors' fees, $13.00	133 00
Telephone and telegraph	93 43
Express and storage	17 02
Half fine paid to factories	456 25
Tenth call on Stock, Farm and Dairy, Peterboro	50 00
Paid loan, $590.00; interest on loan, $13.12	603 12
Balance on hand	316 33
	$6,087 23

Dairymen's Association of Eastern Ontario.

ANNUAL MEETING.

The thirty-third Annual Convention of the Eastern Ontario Dairymen's Association was held in the City of Belleville, on Wednesday, Thursday and Friday, January 5th, 6th, and 7th, 1910.

Mr. JOHN R. DARGAVEL, M.P.P., President of the Association, occupied the chair at all the meetings.

PRESIDENT'S ADDRESS.

BY JOHN R. DARGAVEL, M.P.P., ELGIN.

At a meeting of our Executive Committee, which met in Toronto in September last, a large and influential deputation was in attendance from your city and asked that this, the next Annual Convention, be held in your beautiful city of Belleville, and apparently the right men were sent, as their request was complied with.

I am very much pleased with the outlook for a most successful meeting, and on behalf of the Board of Directors, wish to thank the local committee and all those who have showed a willingness to work in conjunction with our officials to make this convention a success.

In looking over the work of the year just closed, we find that there has been, so far as exports are concerned, a slight increase in cheese but a decrease in butter. The increased make of cheese appears to have been in the Province of Ontario alone. But, as I mentioned in my address of last year, that while this review of the dairy situation may show but very little increase when viewed from an export basis, with an increased home consumption added to the export business the financial side of the question cannot but please the milk producer.

The object of this Association, as stated in the constitution, is to promote the interests of the dairy industry of Canada and more particularly Eastern Ontario. In order to carry out those interests we must, therefore, know what those interests are, what will promote them, and then do those things. There is much that we can do as an Association that as individuals we cannot do. We must promote the interests of the industry as a whole, and do those things which will make dairying more attractive and profitable to those engaged in it. We believe the most important thing possible to be done to promote the interests of the dairy industry in our province is to educate the people who are engaged in it.

But the nature of our business is such that a college course in dairying cannot be acquired by all, though the importance of the industry, and the well deserved attention that is now being given to all matters pertaining to food and food products require a better knowledge of farm sanitation in general and dairy sanitation in particular, to the end that Canada's dairy products may reach the highest possible standard of purity and excellence. Again, the industry can be promoted by a better understanding amongst its followers of the requirements of success. Too many

fail to appreciate the value of the right establishment at the start. The time is very near at hand when a man will not be called a dairyman who operates an ill-adapted farm with inferior animals and an inadequate equipment. No person should be recognized as a member of the great fraternity of dairymen who is not keeping abreast of the times in all that modern, up-to-date dairying means, and it means a well adapted location, stock bred and handled especially for dairy purposes, equipment for the manufacture of dairy products, that will not only be a credit to the producer but to the industry, and an intelligent operation of all these things.

As a result of having been made a member of the Milk Commission by the Ontario Government, I have had opportunities during the year just passed, to visit some of the best dairies in the United States and Canada, and I can assure you that we are a long way behind where we should be. We certainly must have a higher ideal in this business and work towards it, or go out of business. I do not wish, at this time, to forecast what the report of that Milk Commission will be, but I would be wanting in duty as your president if I did not warn you now that better things will be expected from everybody engaged in this business than has been done in the past. The dairy business of this country is of too much importance to allow it to be conducted as is done by some people now engaged in it. I would be criminally derelict in my duty, knowing what I now know, if I did not sound a note of warning to my fellow dairymen in reference to the spread of tuberculosis among the dairy cattle of this country. I feel convinced that this dread disease, even now, exists to a much greater extent than is known to the ordinary dairyman of the province.

For many years past we have been housing our herds in warm stables, many of them, yes, most of them, poorly lighted and ill-ventilated. Tuberculosis is essentially a house disease for either man or beast, and the housing of our cattle, as a rule, is of the most unsanitary kind and especially favorable for the propagation of this terrible plague. Saying nothing about the great moral responsibility we are under to supply our customers with only pure and healthful food products, we shall be sadly remiss to our own natural interests if we do not, each one of us, and at once, take proper and efficient measures to prevent the propagation and spread of a disease, which, if not checked in time, will surely lead to the ruination of our herds and our business.

We have, heretofore, boasted of leading the world in this industry, but we are just now at a point where it may be well to sound a warning note. We are, as yet, the largest exporters of dairy products to Great Britain, but this New Zealand competitor has moved her position from fifth or sixth place in a few years to second place. Listen to what the Dairy Commissioner for New Zealand says in his report: " New Zealand has had a good reputation as a cheese-producing country and so long as the quality is well maintained we need have little fear in marketing the article to as good an advantage as other countries engaged in the same line of business. The dairying industry, generally, is in a flourishing condition in New Zealand, and dairy farmers are to be congratulated upon the distinction which the industry has attained as one of the principal commercial mainstays of this colony."

These people are certainly our keen competitors, and it behooves us to be up and doing if we maintain our present standard of supremacy.

I wish, before closing this address, to say that I have now filled the position of President of this Association for three years with much pleasure to myself, but with what profit to the Association is best known to its members. I am about to

sever my connection with the Board of Directors, and in doing so I feel that I am deeply indebted to the members of the Board who have so cheerfully rendered me their assistance, which has made the work of presiding officer comparatively easy. If the services I have rendered have met with your approval I am more than repaid for my labor, and I tender you my sincere thanks.

ADDRESS.

By Senator Daniel Derbyshire, Brockville.

I congratulate you, sir, upon the address we have just listened to. It has been thoughtfully prepared, and I assure you it will be very inspiring to us all. You talk about the right men being sent to Toronto to influence the directors to hold their next annual convention in the city of Belleville, and I want to say that they were a pretty slick lot, and without much trouble they had all the directors with them to hold their convention here. I must say that as soon as they brought us here, and during the time of our meeting with them, and since making preparation for holding this convention, they have carried out their promises. We, of course, expect all of you to become members. The year just passed has been a memorable one in a great many respects. While our production of cheese in Ontario is slightly increased, the Province of Quebec has been a little less, and in consequence our products for this year are about the same as last year. Of course, the butter business has gone back, over a million dollars less of butter being shipped this year than last and seven millions less than 1905, the banner year in connection with our dairy business. A great many would think that there is less production in our country. I would like to say that our production has been greater this year than in any year in the history of Canada. We have produced more milk of a finer quality than in any year in the history of Canada, and while we have not exported to the Mother Country so much goods, we have consumed them at home, we have a prosperous people, and as you know over a million people have gone into the North-west in the last few years. This last year over 90,000 went into the North-west from the United States, and they had $90,000 000 in money with them. These people are prosperous and good farmers; understand about the handling of the land in the west, and are making some of the best settlers we have. They have to be fed, and we have been making butter and cheese in the east and shipping to these people in the west. We have in the banks to-day to the credit of the people over two millions more money than we had a year ago; this means that the people have a greater buying power, and can spread the butter a little thicker, and they will consume three times as much butter as they did a few years ago. These things we want to take into consideration when we are comparing our production with the last few years. We are cultivating a home market, and that is the best market of all. I have been figuring on the difference of this year, and while possibly my figures are not absolutely accurate yet I have gone into it very carefully. We have over 130,000 cheese in Montreal to-day; 60,000 in the West and about 12,000 in Eastern Ontario. We have about 200,000 cheese yet to go forward of this year's product, and all along the line, especially in the Province of Quebec, some of the dairies that used to sell 23 and 24 packages of butter sold 300 to 400 packages this year. Train loads of cream

have gone from Canada to the United States. The cream is being sold at profitable prices to the United States, to help feed these people who have not got enough wisdom to keep enough cows to take care of their own people, and this business is bound to increase. Right in the town of Brockville, we have been shipping cream for the last two months across the river and it is manufactured into butter there and shipped to New York and Boston, to feed these people on fresh beautiful butter that is Canadian in every respect except that it is made in the United States; we do this to avoid the duty. I want to say that I have carefully figured over this cream, and the immense amount of increase in our cities in the consumption of milk and cream. There are thousands of pounds of butter in Montreal, Winnipeg, Vancouver, and other large cities. Car loads go to these cities nearly every day. And then when you take into account the bacon pig, we have sold $125,000,000 worth of dairy products this year. There is another thing to be pleased about, that is that we have sold a better quality of goods. The Government of Ontario selected a man—and I am delighted that they selected Mr. Dargavel, one of our directors—as a member of the Milk Commission, and that shows wisdom of Sir James. I am sure we all look forward to getting this report because I believe it will be of great importance to the milk producers throughout the whole Province of Ontario. The farmers produced $100,000,000 more work this year than they did before, and we have $2,000,000 more money in our banks than we had last year. Some of you will say "We can rest on our oars and take our ease," but I want to say to you to-day that I am more anxious than ever that we buckle on our armour afresh and that we should give a better cultivation to the soil, and that we should cultivate our farms and have a productive soil, so that we can produce twice as much as we ever did before. In 1908, we had not enough feed to take care of our cattle and make the cows productive because they were starving in the fields, and they were not producing the milk they should. We find that the most important thing in Eastern Ontario is the production of feed. A great many farmers turn out their cows in the spring, and look up in the clouds and think they are going to have rain, and trust to Providence to supply their water and grass, and the cows are looked to give milk no matter whether they are cared for or not. We must make provision to feed these cows every day of the year, provided we expect to get the product we ought to get from these cattle. You remember Mr. Timothy Eaton, the great merchant prince of Toronto. He was getting cream from the farmers until it became so bad that he could not stand it. What did he do? He went out and bought a farm, and commenced to under-drain the soil and cultivate it, and produce twice as much crops as were produced before. He put on good dairy cows, and got them taken care of in a proper way, and the result was that the restaurant part of his business increased seven-fold since he began to make a better quality of milk and butter. If we could get the wealthy merchants in every part of the country to get back on to the farms and use the money that they have in building up such large industries in the cities, then our product would increase by leaps and bounds. We have a man in Brockville, Mr. A. C. Hardy, who has bought a farm outside of the town, and he spent last summer putting in tile and beautiful barns and getting it stocked with cows that are exactly suited for getting milk, so that he can produce more milk on an acre than was ever produced before in that locality.

I would like that every man when he goes home from this convention would look over his stock and his fields, and see if he cannot under-drain and

give his farm intense cultivation, and see if he cannot produce twice as much on each field as he has ever produced before, and see that his cream and milk is taken from the farm and factory in better condition. We are getting into competition with New Zealand. The cheese from New Zealand begins to come into the markets of England in December, and our goods begin to come in about the first of May and while we make 2,000,000 boxes of cheese against 400,000 that they make, still they are in our way to-day, and the merchants are buying from hand to mouth, and expecting more from New Zealand the next week, and using that to bring down the prices of our goods. That is something that is working to our disadvantage, and if we would make 3,000,000 boxes and send them to the British market we would close them out, and they would go right on making butter. They made butter up to five years ago, and then they turned to making cheese because they found it was the most profitable.

In Eastern Ontario we have always studied up the cheese business, and we have been wise in our day and generation. We have made the finest cheese, and we have made money by it, and we have built up a name for ourselves that is known in Great Britain to-day. We ought to take care of our reputation and increase our shipments. With the soil and the climate and the possibilities we have here, we ought to produce twice as much goods as we do.

We all regret the retirement of our President, because for a great many years he has been an efficient director and rendered valuable service to me when I was your President, and to the Board of Directors. He has filled the position of President for a number of years with great acceptance to us all, and to the people in Eastern Ontario. He has been invaluable to us as a member of the Legislature and seeing that the laws were enacted, and seeing that the money for carrying out these things was provided. He has been enthusing the Ministers with the idea of the advancement we were trying to make in giving free education to all the cheese factories, and in taking off the fifteen dollars tax that we collected from the factories. This has all been changed on account of Mr. Dargavel being a member of the Legislature. On account of his being on the floor of the House he has been able to get the Ministers to feel the importance of the cheese industry.

I will tell you that I had the distinguished honor of being Honorary President alone for a number of years, and I would like to move a resolution here this morning that Mr. Dargavel be made an Honorary President of this Association. I think it would be only fair for me to move this resolution, seconded by Mr. Edward Kidd, M.P., that we make Mr. Dargavel, Honorary President of the Eastern Ontario Association. (Motion put to the meeting and carried, with applause). I am sure we all feel proud that we have men who are willing to serve us, and are willing to give us their co-operation and help to make this Association the very best in Ontario. We have led the way in the past, and we must lead the way in the future. The President alluding to the Hon. Mr. Fisher, Mr. Duff, and Mr. Ruddick, said, "I am sure that no words of praise that can be given to these gentlemen for the services which have been rendered to this Association would be too strong." There is another man that I would like to have coupled in with that, and that is Mr. Publow, our untiring Superintendent of the Kingston Dairy School. His services have been valuable to this Association for a great many years.

I would like to speak to you for a few moments on the subject of refrigerator cars. While we appreciate the services we have had in the past we feel that that service should be extended. We ought to have these cars put on earlier in the

summer. Last year we had hot weather in June, and these cars should have been put on two or three weeks before they were put on, and we ought to have them in large numbers so that all our goods from spring to fall could arrive in the British market in the best condition. That is of vast importance. If we spoil two or three shipments of cheese in the spring on account of becoming over-heated, that influences the whole year against us. That is one thing that helps New Zealand. Their goods have to go through a tropical climate, and they have to go in refrigerator compartments. It is impossible to send them any other way, and in consequence of that they do arrive in the British market in the finest possible condition. I am sure that we will see the importance of it. To make Canada famous is the position we all ought to take, and use our influence and our best efforts in getting more money for goods, and making things easier around home. We should have telephones and electric bells around the farm houses. We ought to have all these things, and we can have them, provided we work intelligently and produce more food of a better quality. If I could only get everybody up here in Eastern Ontario to say that they would do better this year, I would love to do it, and I would like to twist the neck of some who I know are not doing it. Do you ever consider what we can do by united efforts to build up this country? It is marvellous, the results that would follow if every one would do his level best.

I am delighted to have had the pleasure of having been here with you. My heart is warmed up to see you take such an interest in your work and I want you to do better business in 1910, than you have ever done before, and that when you do you will have the proud satisfaction of knowing that 1910 was a more prosperous year than 1909.

RESOLUTIONS.

Moved by R. G. Murphy, seconded by J. A. Kerr, "That whereas the success and educational value of this Convention is largely due to the presence of the speakers who have so ably addressed our meetings we desire to express our sincere thanks for their kind assistance and presence throughout the various sessions." Carried.

"That we the members of this Association desire to express our appreciation of the kindness of the Mayor and Council, and citizens of Belleville generally for their co-operation in helping to make this Convention a success." Carried.

"That the thanks of this Convention be and are hereby tendered to the Canadian Salt Company of Windsor, Ontario, through their General Manager, Mr. E. G. Henderson, for the very handsome badges presented by the Company to the Members of the Association." Carried.

"That we as dairymen feel that we are under great obligation to the Departments of Agriculture for the Province of Ontario and also for the Dominion of Canada for the assistance they have rendered the Dairy Industry of Canada." Carried.

"That as an Association we wish to express our satisfaction with the work of the special officers appointed to take charge of the work regarding the adulteration of milk." Carried.

"That this Association wishes to express its gratitude to the several railroad companies for their kindness in reducing rates from all points to Belleville" Carried.

THE CHAIRMAN: I would be more than human if I did not appreciate the very kind remarks that have been made by the Senator Derbyshire and the resolution that you have just so unanimously passed. I note the fact of your selecting me Honorary President very much. I appreciate it from the bottom of my heart; but so far as helping me to take any more interest in the dairymen of this country it is altogether unnecessary. I shall do that whether I occupy an official position or not. I shall do what I can for the interest of the dairymen so long as I can get a dollar to become an annual member of this Association. (Hear, hear.) Senator Derbyshire has been very kind and flattering in his remarks as to what I have done for the Association. I do not take this to myself at all. I have already had the very best of help and assistance not only from the members of the Board of Directors, but you know we have a very efficient Secretary, and without his aid I would not have been able to accomplish even what little I have done. When I look back and see the position of the Association before our friend the Senator became President, and see what this Association was then and what it is now, and see what it has accomplished in all these years I do think that we have done something for the people of this country. I believe that without the aid of the Dairymen's Association the business would not have been in the position that it is in to-day. We must admit that we occupy the foremost position in the world as exporters of dairy products. Unless we had had some association to have guided us in our efforts in the last twenty-five years, I am sure we could hardly have attained the position we occupy. We must not content ourselves by looking backward, by any means. We must look forward and see what there is ahead of us to accomplish in promoting the interest of agriculture. I am sure that there is much yet to be done. Few of us realize the extent of the Province of Ontario, and I must confess right here that it is only lately that I have begun to realize myself the wonderful heritage we have in this Province of Ontario—the wonderful extent of fertile country and the various kinds of climatic conditions, the various kinds of soil we have. It is something to have a grand Province like this to work for, and it should be an incentive to us to leave it a little better when we step off the stage than when we found it, and we should be thankful that the Almighty has privileged us to be born and to live in a country like this. I again thank you from the bottom of my heart for the great honor you have given me to-day. You can always count on me as doing everything in my power to further the interest of the dairymen of the Province of Ontario. (Applause.)

COMMITTEES.

The following Committees were then appointed:

Resolutions: R. G. Murphy, A. S. White, J. H. Singleton.

Legislation: J. W. Johnston, M.P.P., J. R. Dargavel, M.P.P., G. G. Publow, Senator Derbyshire.

Nominations: James Whitton, Senator Derbyshire, Henry Glendinning, J. A. Kerr.

Business: J. A. Kerr, T. A. Thompson, Edward Kidd, M.P., John McGregor, A. S. White.

THE PRODUCTION OF CHEAP MILK.

By Henry Glendinning, Manilla.

In large manufacturing concerns and in high finance you hear a great deal of mergers. They give you as their excuse for merging large concerns into one huge concern that they can reduce the cost of production and that argument is a proper and legitimate one. I do not think it is possible for the farmers of this country to organize a merger or combine in the production of milk or their farm products, but I do believe that they can take a leaf out of the book of those large manufacturers along the line of cheap production. Every farmer in the Province of Ontario can do something to cheapen production.

The first thing that we require to consider in order to produce milk cheaply is that of having the proper kind of cow, assuming of course that you have the farm to pasture the cows and grow feed upon it. I believe the cow that will produce milk cheapest is the cow that has been bred specially for that purpose, and that has blood in her veins running back for hundreds of years, and that has been bred specially along milking lines. I will not discuss that question further. I will presume that you have the proper kind of cow. We require for that cow proper housing, and in these houses we must have proper ventilation; and then we require water, feed and proper care.

I want to say something in particular regarding the housing of the cow. I have had the pleasure this season of visiting more farms than I have ever visited in any one season before. I have visited a number of the best farms in the western part of the Province of Ontario, in connection with the prize farm and dairy competition. I was one of the judges and in the performance of my duties I visited these farms. Practically every one of them had fine buildings, well equipped. But there is one thing I noticed that I think farmers of Ontario are lacking in to a very great extent, and that is ventilation. In most of these fine buildings we noticed a lack of ventilation. The farmers appear to work upon the idea that air is something that we do not require to give very much attention to. Of all things that are required, air is the most important. A cow or a human being might live weeks without food, they might live a number of days without water, but neither a cow or a human being could live five minutes without air. If you take a cow and put her into a room sealed so that no fresh air could get in, or foul air get out, she would breathe enough air contained in a room 14 feet long by 14 feet wide and 14 feet high, at the end of twenty-four hours she would have exhausted the whole of the oxygen, and at the end of that time she would die. We would not like to put a cow into a room of that kind for twenty-four hours, because a greater part of that time she would have been breathing poisoned air.

Now, to get some idea of the size of the building which would be required to contain cows for twelve hours, supposing the doors were closed at night and opened in the morning: If you had a herd of twenty cows, you would require a building 280 feet long, 140 feet wide and 14 feet high. That would be a very large stable for twenty cows. It is not necessary to have large stables to keep cows in proper condition, what you require is to have the stables so constructed that there is a change of air going on continually—fresh air coming in and foul air going out. You will find in some stables a few three inch tile in the top of the wall here and there, just as if these tile would carry off all the foul air and let in all the fresh air the animals require. It is impossible to do so. By placing those tile in the top of the wall and not having any place for the air to get in

at the bottom, you are making a great mistake, and one of these great defects is that they carry off the warm air. We do not want to carry the warm air out of the stables, we want to retain it, but we want to carry off the foul air. Air that has been once breathed and has had all the oxygen taken from it is about one-half times heavier than pure air, and immediately after it becomes cool it falls to the lower part of the stable, and there is where you need to carry the foul air from. You must have it constructed so that it will cause no draft, and will carry the foul air out at the highest point of the barn. If you have your ventilation constructed in that way you retain the warm air, and at the same time keep up the temperature of your stable. Any farmer who contemplates changes in his stable should buy that little book of Professor King's on ventilation. It only costs 75c., and it is a splendid book.

Water is very important. I am in favor of having it constantly before the cows. Some men say that it is better to turn them out and let them have a drink only once or twice a day. I believe that the water before the cow, constantly, is an advantage, because she will not take a large amount of water at any one time, and by taking a little at a time she will be able to heat that amount of water, which is usually down to 40 degrees, up to the temperature of her body, which is something like 120 degrees. If she is taken out once or twice a day she takes in a large amount of water, and the body becomes chilled, and there is little or no secretion of milk. Objection has been raised at times in regard to having water before the cows that they do a lot of lapping and keep their mangers wet. I believe that in every case where you find lapping it is not the fault of the cows but of the system. I have two cows in my own stable that lap, and I watched them and their heads are a little longer than the others, and they had to put their heads under the rack to get the water, consequently they hold their heads a little bit sideways and lap. Basins that do not feed fast enough are another cause of lapping.

I believe a cow should have a constant supply of salt; they should at least have salt once a day in the stable as well as in the pasture field.

The question that I want to discuss most this morning is that of feed for cows. Everybody will acknowledge that without a good supply of feed you cannot get a good supply of milk. We have none of these troubles in the summer time when the grass is plentiful. Grass contains all the requirements for the production of milk and there are other things that tend to give a large flow of milk at that time of the year. For instance, the cow is out in the pure air, she has abundance of air and plenty of water. She has cast off her old hair and her skin is clean and under these conditions, with a good supply of grass, little thought need be given to the question of feed; but when we come to put a cow into the stable under conditions entirely different to that, we require to give the matter a great deal more attention.

We should try to imitate these outdoor conditions as much as possible. The stables should be warm and comfortable and contain plenty of fresh air and sunshine. Sunshine and air are two of the cheapest things we have in this world and some farmers think they are the least required.

Our president gave us a splendid address this morning, in which he touched on the question of tuberculosis. I think he could not speak too strongly on that point. Tuberculosis is a great deal more common in the country than we think of, and if our cows had plenty of fresh air and plenty of sunshine, that disease would not be nearly as prevalent as it is. I believe that if that disease is to be

stamped out of the country, it will be stamped out to a great extent through these two agencies, fresh air and sunshine. Our stables should be in a comfortable, sanitary condition if we are to do good work in the winter, and we must have the feeding conditions as near summer conditions as possible. The food should be bulky, succulent and palatable and at the same time cheap.

DIGESTIVE NUTRIMENTS OF FOOD STUFFS.

——	Dry Matter.	Ash.	Protein.	Carbo-hydrates.	Fat.	Nutrient Ratio.
June Grass (green)	34.9	2.8	3.	19.8	.8	1: 7.2
Corn Silage	20.9	1.4	.9	11.3	.7	1: 14.4
Mangels	9.1	1.1	1.1	5.4	.1	1: 5.1
Timothy Hay	86.8	4.5	2.8	43.4	.4	1: 16.7
Red Clover Hay	84.7	6.6	6.8	35.8	1.7	1: 5.8
White Clover Hay	90.3	8.3	11.5	42.2	1.5	1: 4.
Alfalfa Hay	91.6	7.4	11.	39.6	1.2	1: 3.8
Wheat Bran	88.1	5.8	12.2	39.2	2.7	1: 3.7
Oats	89.	3.	9.2	47.3	4.2	1: 6.2
Milk	12.8	.7	3.6	4.9	3.7	1: 3.8

Silage and roots will give you a bulky succulent food that will be palatable. I have heard men say that roots would not have very much in them because they were 90 per cent. water. They say we could feed dry feed to our cows and they could drink water and they will give as good results. I venture to say you will get better results from food that is naturally of a succulent nature. The most important element for milk production in a food is that of protein. In silage you have a small amount, and you will come to grief if you feed corn silage entirely and expect a big flow of milk. You cannot do it. A cow is compelled to consume a very large amount of silage before she will get enough to produce 100 pounds of milk. However corn silage as a basis is one of the best foods we have, although we have to substitute something else with it. Wheat bran is being very commonly used through the country, but it is becoming very expensive; very few people care to buy large quantities of wheat bran at the present prices and sell milk at the current prices. We have in alfalfa hay a product that is nearly equal to wheat bran, and we can raise that at our own farms, and for profitable milk production we must raise the feed on our own farms. I do not think it will pay to purchase feed even if you sell the milk at what is considered fancy prices in the cities. There is not very much in it. Alfalfa hay has all points as against wheat bran a little over twelve.

We do not run an experimental station at our place, but once in a while we make some tests. It is rather expensive to carry on experiments—weighing up everything carefully and keeping track of it. But commencing on the 29th day of March last winter, we put three cows under test. These cows had calved from three to six weeks, so that they were in good condition for putting under test, and they were all in good physical condition. Two of them were fed exactly alike and one was fed a little less. Two of them, each consumed 280 pounds of corn silage in the week and we placed the money value at $1.25 per ton on that. That is what we considered was the cost of production; not what it would sell

for but what it cost us to produce. That was 17 1-2c. for each of these two cows. They consumed 140 pounds of roots at 4c. per bushel, a little over 9c.; 145 pounds of alfalfa hay at $4.00 a ton, 29c. each.

The other cow did not eat quite so much. She consumed 245 pounds of silage, but she ate the same of the other stuff. The money values of these foods for one week was $1.65 and a fraction over. Those cows gave 602 pounds of milk. Two of them tested 4.6 of butter fat, and the other 4 per cent., and the amount of butter fat that that milk contained was 26 and a little over in the seven days. Now, the cost of producing that milk was 27 4-10c. per hundred pounds. You will notice there was no grain of any kind fed except the grain that grew in the corn, no chop.

The following week they were not under test, but they were being brought up on chop until the two weeks following they were put on test again. They had been brought up gradually with the food so that there would be no rapid change, and they were then fed five pounds of chopped oats each. The cost of producing that milk was considerably increased, we got a little more milk—we got 692 pounds, that was 90 pounds more milk than we had before. The cost had been increased from $1.55 to $2.88 by the addition of that chop. Now, I want to say that the chop was not charged at the cost of production; because I do not know what it cost us to produce it, but it was charged at $25 a ton. The cost of producing that milk was increased from 27 4-10c. to 41.8c. (nearly 42c.), just by the addition of that five pounds of chop to each of these animals. The first test produced butter at 5.4 of a cent, while in the other the cost was increased, and it cost 51 per cent. more to produce milk and butter by the addition of that five pounds of chop. Prof. Dean made a statement at Guelph during the winter fair along this line: "I believe the farmers of Ontario could very materially reduce the amount of grain fed to their animals." I have been working along this line for a number of years, and I was pleased to hear Prof. Dean make that statement. The little experiment we conducted last winter shows that it increased the cost of producing butter fat 51 per cent. by adding only five pounds of meal to the ration. What would it cost to produce milk if you add twenty or more pounds a day? During the winter fair at Guelph I understand some of the cows were receiving twenty pounds of chop a day. It would be interesting to know how much profit there was from the milk obtained from cows fed in that way.

I believe the salvation of this country, so far as winter dairying is concerned, is in the feeding of a rough bulky food containing the proper nutrients, and I believe we come nearest to that by feeding corn silage, alfalfa hay, and roots, combined, and in feeding these there is not the least danger of your animals going off their feed. When you feed a large amount of corn, there is always danger of the cows going wrong in their digestive system.

I do not know that I have any more to say but I expect some of the gentlemen here will have some questions to ask. I have only touched upon the subject and I prefer you should ask questions.

Q. Why did you feed oats to those cows instead of something else that has protein?

A. They were having too much protein as it was. We had protein in the alfalfa hay. Those cows were getting a ration of one to five and when you feed oats they are about the proper thing. If I had fed pea meal it would have been as good a ration as oats.

Q. What did you feed your cows before the first test began?

A. They were fed exactly the same as what they fed the first week.

Q. Do you think you can retain the flesh on the cows without grain?

A. Yes, we do, and when it comes to drying up time, those cows will get fat.

Q. How much does it cost to produce butter on June grass?

A. I cannot answer that question. I can tell you a good deal better what it cost to produce in the winter stable. Those cows cost us about six cents to produce butter, a little over five cents to produce butter fat. I do not think we produce butter on the summer grass twice as cheap.

Q. What would you recommend to feed when you are not milking in the winter?

A. I do not think that you can feed anything better than that, because I think you can produce that as cheap as anything else on the farm. I think one of the mistakes many of the farmers are making is that they let the cows run down in flesh when they are drying. If we are going to get good results from cows we must have them in high condition when they calve. Of course, I know when cows go dry they always get a considerable quantity of straw. I am not saying not to feed straw. If you had to produce one food alone for cows, I do not know that you could produce anything cheaper than alfalfa, but alfalfa and corn combined make the best ration.

Q. Don't you think it would cheapen the cost to feed straw instead of hay?

A. I am not feeding any hay except alfalfa.

Q. Don't you think straw would be cheaper than alfalfa?

A. No, I don't think it. Straw has a nutritive ratio of about 1 to 34, and if you feed corn silage and a few roots and straw you would have a ration that your cows would not flesh up, but they would go down in flesh. You would have to feed protein, when they are either milking or dry, to get the best results, but more particularly when giving milk.

Q. Do you think that a test for one week is sufficient? Do you not think the feeding of grain would improve the condition of the cow, and she would give a larger yield, and the cost per hundred would be reduced?

A. This was the second week we fed grain. There was one week in between to bring them up to that point.

Q. The first week you were not giving them the full feed?

A. We commenced with a couple of pounds a day and brought them up gradually and they were being fed five pounds before they commenced and five pounds during the whole of that week.

Q. The improved condition of the cow in flesh would not show in one week?

A. I do not think she would improve, because you had all the nutritives in that alfalfa hay, that you have in the grain, we do not want to lose sight of that.

Q. I have fed alfalfa hay, and I do not see much difference in that and red clover.

A. Did you save it well, and were the leaves all on it?

Q. Practically.

A. That silage cost us $1.18. There is a great deal of difference in alfalfa hay. If you do not cut it just at the right time, you are apt to lose a great many leaves, and they form the most important part of the plant. The stems of alfalfa, I do not think are any better than the red clover.

MR. HYATT: You figure the alfalfa hay at the cost of production and the oats at market price. You should give us the oats at the cost of production.

A. I do not know. I have not got it; I do not know what it costs to produce oats. That was the market price.

Q. Put alfalfa hay up to the cost of the market?

A. If I sold alfalfa to myself and fed it, my profits would be the same.

MR. HYATT: That just makes the whole story look a little crooked. If the prices are not at the cost of production, then the alfalfa must be put at the market price.

MR. GLENDENNING: I only know a few things and Uncle John Hyatt is one of the men I have gained a good deal of information from, and perhaps he can tell us the cost of the production of oats.

MR. HYATT: I cannot do it.

MR. GLENDINNING: Then there you are, two of us alike. I knew when I figured that up that it was open to that objection. What is the use of me talking about somethng I do not know?

Q.—Are you not a little low on the cost of silage?

A.—No.

SENATOR DERBYSHIRE: How do you keep the flow of milk up in June and all summer, when it costs very little? If the farmers would prepare silos for the year before at a cost of $1.18 a ton, and had them ready to open up just the moment the dry weather came in the summer, it would pay. It came last summer and it will come next summer, and every one of you farmers know that if you let a cow go dry in the summer she will never come up that year, and it is a woeful mistake to not have a good supply of feed on hand for the dry spells during the summer.

MR. HYATT: How would you recommend us to proceed?

SENATOR DERBYSHIRE: I would take 2½ acres or 4 acres that was near at hand, and I would tile drain that every 8 rods and have the water conducted off the field; and I would plow that field and fit it for a crop, and then I would plow it again, and I would plow it the third time, and I would put on the disc-harrow and I would put on all the manure that came out of the stable and fit that land for an immense crop, and I would have a cedar swamp of corn for the next year.

MR. GLENDINNING: I have not got the figures with me, but I know of people to whom these figures were submitted a year ago and they thought they were fair. I thought they were too low, but after thinking them over, I came to the conclusion there was no fault to find with them. I placed the figures at $1.25, but the actual cost was $1.18.

A MEMBER: I am satisfied you can produce it for $1.25. I have heard men say they can produce it for less.

A MEMBER: We do not have much trouble to raise corn, but this alfalfa clover seems to be a trouble. We cannot even do it for $10 a ton, and we have tried it a good many different ways.

MR. GLENDINNING: I have been growing alfalfa for some fourteen or fifteen years and if I heard anybody speaking as I have been speaking to-day, eight or ten years ago, I would say just the same as that gentleman in the audience who has just spoken. We got good crops of alfalfa, but it always disappeared in the spring, but in every case we were able to trace it to one thing, and that was pasturing the alfalfa in the fall of the year. It may be that alfalfa can be pastured in the fall under certain conditions, but it is not a very wise thing to do. Take the side of a hill exposed to the south, and alfalfa will stand a great deal more rough usage there than on level ground, just the same as fall wheat will come out better in a south-east exposure, and the alfalfa will come out better. The proper thing

is not to pasture alfalfa at all, and do not cut it late in the fall. When the snow came our alfalfa was about 16 or 20 inches high, and my neighbor said to me, "Why don't you cut that, there is a lot of good feed going to waste," but I did not think it was going to waste. It was left there to hold the snow, and we have a blanket of snow over that field at the present time.

Q.—Did you cut it three times?

A.—We only cut twice, we could have cut it three times, only there was such a dry spell in June and July that we did not do so.

Q.—How did you keep up the milk supply during that dry weather?

A.—We fed some of the alfalfa; it is one of the best things we have got. We had fifteen acres of it on hand. It comes at a time when there is nothing else except oats and peas. In fact that year, oats and peas were so short that you could not cut them.

Q.—Why didn't you feed silage at that time?

A.—Because we did not have it. I would have liked to have had it, but it was all fed owing to the late spring.

Q.—Is there any unpleasant odor in the milk, owing to the feeding of ensilage?

A.—There is not. You may have a flavor from silage, but if you have good silage, and your cows are milked in a cleanly condition, I do not think there is any danger whatever of trouble. Most of the odors that you get in the milk of a silage nature, come from the outside, not from the inside. I have tasted milk with a silage flavor, and after going to the stable, where the cows were kept, I was thankful that there was nothing worse than a silage flavor. If the silage is rotten or decayed, I think there is danger, but from good silage you need not be alarmed.

Q.—What is the best kind of silo to build?

A.—I have two wooden ones, and I have the cement on hand to build a cement one next summer. I believe the cement silo is the best.

Q.—Does the frost go through the silo and freeze the silage next to the wall?

A.—It will, just the same in a wooden silo. It depends on how you take it out. If you take the silage out properly you do not have any frost from a wooden or cement silo. Keep the outside a little low and you are all right. If you take the inside out first you will have frost. (Applause.)

PROBLEMS OF THE DAIRYMEN.

By George A. Putnam, Director of Dairying, Toronto.

We in the Department of Agriculture are called upon throughout the year to attend a great many meetings in the different parts of the Province, and the Deputy Minister and myself, who will be with you to-night, always enquire very anxiously about the Dairymen's Association meetings, because we expect a good time and a profitable time, and we have never yet been disappointed. Something of good always comes out of these meetings. You will remember that we had a meeting in Picton two years ago, and some of us had our doubts as to whether or not we would have a real good convention at Picton, because it was so far removed from the centre of the dairying industry, but you will all remember what a profitable time we had, and we have been glad to know that the enthusiasm on that

occasion has resulted in some good to Prince Edward County, and, in fact, we believe, to the whole of Eastern Ontario. I remember well that the Deputy Minister took occasion at the evening meeting to say something regarding Women's Institute work, and the people of that district are always looking for something good. They were so impressed with what Mr. James said, that they asked me to send a lady delegate down there, and I did so, and we have nine thriving Women's Institutes in Prince Edward County, and they are doing a great deal to make life in the home much more pleasing and attractive than it formerly was. No doubt you have heard from the President's address, this morning, something as to the progress which has been made along dairy lines in Eastern Ontario during the past year. I believe real progress has been made throughout the whole Dominion, and it is gratifying to us to know that the efforts of the instructors and the Directors of the Association have resulted in a general advance all along the line. We notice that the makers and the owners of factories are taking an increasing pride in their business. They are showing a renewed confidence in the dairy industry. They are building upon more substantial lines, and they are making improvements which lead us to believe that they have confidence in the future of this very branch of Agriculture, and we believe the day has come when it will occupy a more prominent position relatively. They are taking a pride in their factories and fixing them up a little better. You see a great evidence of thrift and neatness, and they are observing sanitary conditions to a greater degree, and we believe that the owners will be rewarded by having altogether a better financial condition as the years progress. We have been more than gratified at the responses which we have had in the Department to the applications which we sent out for the registration of factories. The Deputy Minister asked me the other day how many applications we had, and when I told him we had 1,081 applications already, he said that he had no idea that the factorymen would respond so nobly. Registration may not mean so much, but it means this to me: that the factorymen are ready to co-operate in any line of work which has for its object the betterment of dairy conditions, and we will be able to do even more for the dairymen when they show this confidence in the work which the Department and this Association has in view. The makers are also showing renewed confidence in the business which they have chosen. They realize that it is something besides mere manual labour. It is a profession combined with strenuous manual labour. We believe a proficient maker needs to have as much scientific knowledge as so called professional men. In fact, he needs to know a good deal regarding many sciences, such as bacteriology, chemistry, sanitation and refrigeration, any one of which forms a large field for investigation, and for study. We believe that when we put into effect the legislation which has already been passed, the granting of certificates to makers, that while we have a large number of makers who are first-class men, we will have a still larger proportion of competent, industrious men, coming into the dairy field.

So far as the producers are concerned, we find that they are making rapid progress. We have been more than gratified during the past summer to know that many producers have made provision for the dry months of the fall, and grew grain and heavy crops of alfalfa to a larger extent than ever before, and then Mr. Publow tells you in his annual report that although we had six thousand less cows in Eastern Ontario during the past year than the previous year, yet the output of cheese was 50,000 boxes greater. From 6,000 less cows you have produced 53,000 more cheese. That means a greater increased profit, because you had 6,000 less cows to keep, and you made more cheese. Part of it was due, no doubt, to better

weather conditions, but a great deal of it was due to the fact that the farmers are taking a greater interest in weeding out the poor cows. I believe that the short season, which you had two years ago, will prove a blessing in disguise, and you may say that it was well that you were afflicted, because I believe that the average production of the cows is much better than it was three years ago, due largely to the conditions I have enumerated, and also to the good work in which my friend Mr. Wheatley is engaged—inducing the farmers to find out what the individual cow is doing.

Mr. Glendinning has told you that you can grow alfalfa, and some men in the audience have said that they have tried it and found that it cost ten or eleven a ton. We sent out a circular letter from the Department of Agriculture early last spring, asking the prominent farmers, in practically all the sections of the Province, what experience they have had in growing alfalfa, and the extent to which it was grown in their locality. In a great many cases we got replies similar to the statement made by the men in the audience, that they had made trials time and again and had failed, but from practically every section in the Province, practically every county, we have got word from men stating that they have grown alfalfa. Many of these men who are now growing it successfully stated that they had several failures because they had not put their seed in right or had put in too heavy a cover crop, or pastured too close. I believe I am safe in saying that alfalfa can be grown in practically every section of this Province. If the land is properly prepared for it, and if it is given proper care, there is no crop which would be more profitable.

I had the pleasure this summer of taking a trip through Western Canada and returning by the Western States, and I was very much impressed by the fact that, roughly estimating it, in many of the far Western States, fifty per cent. of the tillable land was under alfalfa, and land which some few years ago sold for $25 an acre, is now bringing $152 an acre, and that is due largely to the fact that they have grown alfalfa. By applying to the Agricultural College, at Guelph, you can get a nitro culture which will inoculate your soil and make a crop almost certain.

Growing feed is of no greater importance than the weeding out of the cows, when you realize that one cow will make as much profit as forty other cows in the same district. That does not mean that one cow gives as much milk. What do we care whether we make three million or five million cheese; it is the amount of profit we are after. If you can get as much profit out of one cow as you can from forty, you would be foolish to milk the forty cows, and if you can make as much profit out of one million cheese as you can out of two million, then it would pay you to make the one million of good quality. The producers are showing that they are prepared to co-operate, by the better care they are taking of their milk. This holds good in Western Ontario as well as the East. The instructors tell us there is more hearty co-operation on the part of the owners and producers, and it is only by hearty co-operation of all engaged in this industry that we can hope to attain that success which we all look for.

You remember some years ago, that we had almost to force instructions upon the makers and the owners; but now, although we have a greater number of instructors, the trouble is to meet the demands for assistance that come from the various factories.

Mr. Publow, Superintendent of the Eastern Dairy School, informs me that the makers are showing renewed interest and confidence in their business, by the large number who have applied for admission to the Eastern Dairy School this

year; a great many more applications than we ever had before. Even the dealers will admit that the cheese was good after they had settled up, and they are unanimous in saying that the product has shown a marked improvement this year, not only a better uniformity and a better quality throughout, but the proportion of rejected cheese is much lower than ever before, and we must admit that progress has been made. You must remember that the nearer we get to perfection, the more difficult it is to make progress, and while we may congratulate ourselves upon the fact that we have made progress in the cheese and butter industry, we must face the fact that our problems have increased.

Coming down on the train I met a friend I had not seen for about twenty-five years, and he stated to me that about thirty-five years ago my father called at his place to sell him a machine called the old Joseph Hall Reaper, which cut the grain, but you had to have a man to rake off the sheaves. He stated that he never forgot the remark that my father made to him. He said, "I tell you it is simply impossible to improve upon that machine." That was his attitude at that time. It was then thought to be simply impossible to improve upon that machine. But you all know that the most decided improvements have been made, and some of you may say it is impossible to further improve the quality of Ontario cheese. I believe we have just begun to make improvements along this branch of agriculture. In fact, in a great new country like this, it is possible we have only just begun to make improvements along all lines of development. See our mines and our transportation. We read in the papers to-day that there are possibilities of gold being found in paying quantities up in Northern Ontario, and you know what they have done in silver. You will see a great many more railroads and trolley lines in the near future, and the same thing holds good in dairying. We are just beginning to make advances. What does advancement depend upon? It depends upon the quality which we aim for in our work. Progress will depend upon whether or not we improve the quality and set up standards and maintain them; and if we do that, Ontario would become the breeding ground for live stock in the Dominion, and the same thing would be true of seed production. We would be the great seed producing Province in this Dominion if we followed the instructions we are receiving. Our problems will be more numerous and more difficult with the raising of our standard. We cannot remain stationary, and it is not usual for Canadians to say, "We will retreat." Therefore, we must go ahead.

So far as the producer is concerned, I shall not mention but one or two of the many problems which face him. The great problem for the dairymen of Ontario, to my mind, is cheaper production of milk, whether that cheaper production consists in cheapening of the feeds or weeding out of the cows. By keeping up the quality of the milk, we cheapen the production. A little extra care in the handling of the milk means a greatly increased product, provided you can get all patrons to take equally good care of the milk. Makers should be better equipped for the responsibility which rests upon them, and we believe that when we put into effect the granting of certificates, that men will be attracted to the industry in large numbers. Factory owners are showing a desire to establish their business upon a permanent basis which indicates that they have confidence in the future, and we trust they will adopt means whereby larger factories will take the milk from the larger areas. Surely the dairymen will see the fallacy of establishing small factories which are not large enough to support a man who is capable of making first-class cheese. A maker cannot afford to spend his time in some of the small factories which are established in Eastern Ontario.

I believe the factory owner has something which increases in value. Farm produce is increasing in value, and these prices are likely to be maintained for years at least, and the people generally are coming to appreciate more and more the value of dairy products as a food. As compared with meat and other articles of food, there never was a time in Ontario dairying which called for greater vigilance than the present. Not only do makers require scientific training, but the producer must be something more than the mere feeder and milker of cows. He must have a knowledge of up-to-date methods of herd improvements, and the cheaper production of feeding, and scientific methods of handling and cooling the milk, and he must be a financier. A man to be a successful dairyman must compare favorably with some of the so-called large businessmen. They require to have capabilities along various lines.

Without co-operation between the Department of Agriculture and the makers and producers, we will not have that progress which we are looking for, and I therefore appeal to you to be frank to us in the Department, to be frank with the Association, and to be frank with each other, and we will see even greater progress in dairying than has been in this good old Province of Ontario before. (Applause)

ANOTHER YEAR IN COW TESTING.

By Chas. F. Whitley, Ottawa.

We are as yet simply at the threshold of cow testing, education in this matter is a gradual ripening of experiences and necessarily slow.

Records considered simply as an accumulated mass of figures are of but little value, one must be alive to what they suggest: they form a real study in black and white, and need to be approached with a mind hungry and thirsty for the valuable and meaty lessons they contain, easy of digestion and ready for assimilation.

1. *Why keep records?* They are a distinct mark of modern times, and business like. Every business-like farmer keeps accounts, on the same principle that he enjoys modern machinery, good plumbing in his house, a top buggy and telephone, and travels in a comfortable railroad car instead of a ramshackle old stage on a muddy road.

Dairymen are beginning to realize that they are managing a somewhat intricate business, a real manufacturing establishment. Profit depends on skill in management as applied to constant watchfulness in keeping down expenses. This means no trusting to vague estimates, but careful figuring, so as to employ only economical up-to-date methods, suitable cows. Passenger engines are not for switching cars in the yard limits, small freight engines are not for express passenger runs. The dairy type of cow is needed.

Several recent sales prove that with records available for inspection the stock sells for a higher price.

We need far more front rank cows, too many have just been loafing in the awkward squad marking time, they want moving along at a quick march into active service.

The irregularity of many individual yields of milk and fat is called attention to by records. Cows have evident preference for some particular milkers. Tests

vary considerably from several known causes and some unknown. A low test does not necessarily mean more cream for the porridge that morning, or an open can on the milk stand during a rainy night.

Records promptly inform the owners which cows are "off their feed." Illness may thus be given warning of approach and serious trouble be averted.

Records train one's sense of observation. The most successful dairymen are those who perceive the obvious facts that surround them. One man sees quickly if anything is wrong with a cow, the unobserving owner wakes up some morning to the fact that the cow is nearly dead. The one is careless and deaf to speaking facts, while the other studies what cows need and why. He reads and profits by his own and others' experience, so that he makes more—doubly so, in that while feed and living expenses are higher, his cows produce more and his farm improves.

He takes stock in a fairly correct fashion so as honestly to face facts and present conditions. Thereby he makes useful comparisons, with previous years' practices and results, with the practice of his own locality, and with the practice of the best men and localities. Good records are always encouraging. One man at Scotsburn, N.S., has in three years actually *doubled* his average yield per cow. Several men in Ontario point with pride to records of over 1,000 lbs. milk and 40 lbs. fat per cow for four or five months running. British Columbia owns cows giving 1,900, 1,800, 1,700 lbs. milk for three consecutive months. The stock-taking again aids in training the faculty of observation, the review of past events acts as a spur to further endeavour, inducing foresight.

Such observation of records shows the cash value of cow testing associations, it confirms or dispels suspicions of there being some poor cows in the herd, it shows if any are robbing one steadily of a large share of the profits, it gives definite knowledge about every cow in the herd, and such knowledge pays handsomely. Many herds exist, for instance, where the profit from the best cow is equal to the profit from the combined efforts of the six poorest. Is it not an absurd condition of affairs that will keep a man unobservant of the fact that he is at all the expense and has all the labor of keeping six poor cows, where one is just as profitable?

Dairy records thus assist in quickly building up a highly profitable herd.

Chart No. 1.—Comparative Yield of 248 Cows in 18 Herds for Full Period of Lactation, Ontario.

Average, 5,985 lbs. milk; 3.5 test; 211.7 lbs. fat.
Average of 18 best cows, 7,733 lbs. milk; 3.3 test; 258.3 lbs. fat.
Average of 18 poorest cows, 4,206 lbs. milk; 3.7 test; 156.8 lbs. fat.
Best individual, 13,742 lbs. milk; 3.4 test; 472.4 lbs. fat.
Poorest individual, 2,670 lbs. milk; 3.5 test; 94.9 lbs. fat.

Chart No. 1 illustrates graphically a few comparisons in the yields of 248 Ontario cows. The average yield, close on to 6,000 lbs. milk, is too apt to be taken as indicative of good all round cows. It comes as a shock to find that two such extremes as 13,740 lbs. and only 2,670 lbs. are included. This shows immediately how thoroughly one can be misled by ignoring the fact that an "average" institutes no comparisons, but simply a comforting blanket thrown over the cold deficiencies of many a delinquent. An average in connection with herd yields should immediately awaken enquiry as to what is included; otherwise, and frequently to one's loss, cows under the 3,000 lbs. mark may creep into undeserved credit amongst the 6,000 pounders.

On the other hand, such individuals as this 13,000 pound beauty are likely to be completely overlooked. Their light is literally shining brightly, but the befogging average drops a bushel basket over it.

Between the 18 best cows (one in each herd) and the 18 poorest there is a difference of over 3,500 lbs. milk. This illustrates what is the actual difference in efficiency between cows in hundreds of herds to-day, and points to the absolute necessity of taking careful notice of each cow's performance separately.

Some men object to the price of the outfit for weighing and sampling, but for the trifle of cash he expends the member receives many benefits: the records of his own herd with all the wealth of information they contain, the opportunity to compare results in other districts with his own and profit by the comparison, the advice of government officials constantly travelling round the farms, and the discussions at monthly meetings. Cow testing associations are thus practical in operation, economical in cost, educational in scope and profitable in results.

The few minutes a month spent in recording may save from a bad bargain. A member bought five cows at $25 each, thought and said to be "no good," yet one gave 10,000 and another 13,000 lbs. milk. The unobservant man may lose money. Another member bought two cows at the same price, one gives actually twice as much butter-fat as the other, and the poorer was thought by the seller to be the better cow. Records save money.

2. *Records indicate that we can easily increase considerably the number of cows kept, the average production of each cow and each acre, the revenue per cow and per acre, and the net profit.*

The consumption of milk and its products is steadily on the increase and the demand for good cows is not falling off, so that with increasing population no "over-production" bogey need scare us. Ontario at present has 7 cows for every 100 acres of cleared land; with suitable crop rotation ensuring abundance of succulent feed, there could easily be four times as many cows. A great railway magnate has predicted that the United States will soon have to import wheat! We need seriously to enquire if our methods tend towards an increasing revenue per acre, from better seed, better methods, bigger crops. Our cows must be fed; bread and cheese is still demanded in England, and fancy butter here.

A low average return holds back real progress and cheats men out of genuine success. Such good averages as 8,000 lbs. milk from 50 cows, as obtained by a man near Ottawa, should help to instil ambition in other minds. This maxim might well be heralded to every farm: Don't figure on how little profit you can "get along with," but "how much profit" can you make. Get the utmost possible from each cow.

The total yield of milk is largely influenced by the training to a lengthy milking period. This naturally begins with the first season of the young stock. Our records show a very large proportion of cows dry in eight and a half and nine months. They could easily work another six weeks. Many that calve in March are just dribbling along in September and go dry in October. Can any business stand that proportion of spare time? Could a store, usually open ten hours a day, Monday to Saturday, afford to remain closed a day and a half, and not open for customers till one o'clock Tuesday afternoon instead of eight a.m. Monday?

The very fact that pasture may be scarce in August should lead the observant dairyman to provide other feed. Shrinkage in milk yield and smaller factory cheques can be largely prevented. Good records around Ingersoll were made on a

farm where there was no pasture after the middle of July, but where forehandedness had the summer silo stocked, where alfalfa, corn and oil cake played an important part.

Some Ontario records showed cows giving 1,000 lbs. milk in September, but only 460 in October; or again, 520 lbs. in September and actually dry in October; while in contrast to this some Quebec records noted a positive increase in September milk over August of 63 per cent.

We need to digest the fact that cows all around us are being educated to give 8,000, 10,000, 12,000 lbs. and upwards of milk. We have been contented too long with a dipper full when we should have gallons.

How much profit per day do your cows earn? There are hundreds that do not earn one cent per day; even allowing only $25 for cost of feed. Some have to be fed seven or eight days to pay one cent profit over cost of feed. Roughage and grain cost, perhaps, 5c., plus 5c. for maintenance, and the cow just exists, yielding scarcely 3,500 lbs. milk; but if her individuality and dairy characteristics warrant it, she may have an extra 8c. worth of feed and be coaxed up to an annual yield of 300 or 400 lbs. fat. Some cows, it is proved, have had $20 worth more grain, and have given $40 worth more milk. Feed, therefore, to tip the scale of profit well down. Do not try just to balance the beam. To keep 15 or 20 cows just alive, but dead to any ambition of productiveness, is not profitable; better by far only keep ten, each one a hummer. We need cows that are blessings, not calamities. Their conversion depends largely on watching records.

CHART 2.—COMPARISONS OF THE ONE-QUARTER BEST AND THE ONE-QUARTER POOREST OUT OF 524 COWS AND 86 HERDS IN 22 ONTARIO ASSOCIATIONS.

Average Yield, 5,870 lbs. Milk, 3.5 test; 206.4 lbs. fat.

	131 Best Cows.	131 Poorest Cows.
Average Yield	7,893 lbs. milk.	4,197 lbs. milk.
" "	282.6 lbs. fat.	145 lbs. fat
Gross Receipts (Fat 24c.)	$67.68	$34.80
Cost of Feed	34.00	34.00
Profit Per Cow	$33.68	80 cents.
Total Profit	$4.412 00	$104.80

Thus, 25 good cows made as much profit as 1,050 poor cows. It took 456 poor cows to make a profit of $1.00 per day!

Chart No. 2 presents some facts in a somewhat new light. Taking 524 cows and leaving out half of them, those that come nearest to the average, the remaining half is divided again so as to compare the one-quarter best and the one-quarter poorest. It will be noticed that in the fairly satisfactory average yield of 5,870 lbs. milk the poorest cows are included, but they give only 4,197 lbs., or in other words, they are credited with 1,673 lbs. more than they actually gave.

This, again, is where averages are likely to be quite deceptive. Taking simply the value of product and the cost of feed it is seen that the poor cows gave only 80 cents net profit on their year's work, while the best cows gave over $33 net profit.

Calculating it another way, a herd of 25 selected cows made as much profit as 1,050 of the kind that are allowed to pension themselves on the unsuspecting

owner. This is the kind we cannot afford to keep—no one can. One would have the colossal task of handling 456 of such calibre to make the astounding profit of only one dollar per day. This must surely open men's eyes to the absurdity of permitting such harpies to prey upon them.

3. *Without a knowledge of the cost of feed per cow, the milk record stops just short of its logical outcome.* Does a cow consume $25 worth or $45 worth? Or, what net profit does each cow bring? If crops are sold on the market the cash return and the profit are easily calculated, but if the crop is marketed through the cow as milk, where does one stand? Is each cow worthy your attention and thought, or is she simply a makeshift?

Records enable one to ascertain the profit made by each cow. Some are apparently not capable of giving any profit at all. Large numbers are left to browse contentedly in the residential section of many communities; they need moving up to the business district. The extraordinary variations in this respect suggest the need of vigilant study of individual performance. The business-like cow, the one returning a large profit, is the kind needed on every farm. She is to be found in increasing numbers only where careful records are kept.

From feed worth one dollar, five cows in a herd gave milk worth 70 cents, 89 cents, $1.20, $1.49 and $1.70, or a variation from a bad loss up to 70 per cent. return on the investment. Many farmers loan money and expect good interest, but with cows it seems different, feed is loaned and no returns looked for.

A storekeeper would be running on a loose principle if he said, "I have sold a few kegs of nails, a chest or two of tea, and a good many pairs of boots, and have taken in plenty of cash this year. A lot of goods have gone out on credit, but I did not bother keeping track of who got them; some will come in any pay up. Possibly some won't, but I don't lose much." It is precisely so with cows. Too many have had extended credit, their bills are long overdue; some are regular "dead beats" and will never pay.

Feed records give most valuable information regarding the capacity of each cow in the herd, at the same time enabling one to feed economically by adjusting the character and quality of the feed to individual tastes and requirements with the object of obtaining the largest possible net profit. A cow may produce milk at a cost of 90 cents, or $1.25, or even $2 per 100 lb., but another in the same herd may give her owner the benefit of such a low cost as 70 cents, or 63 cents, or even 50 cents. This is where records are of immense value.

4. *Dairy records prove conclusively the marvellous value of a good pure-bred sire.* Every dairy farmer ought to be keenly alive to both the value and economy of using only dairy sires for dairy purposes. Special dairy quality is a marked feature of some breeds and some families, their power and perfection come by reason of having been bred with a definite purpose in view from long lines of ancestors of like quality, veritable dairy kings and queens. Then, if breeds are crossed, or grades used on grades one can only be working at random, worse than that, actually demolishing the painstaking and patient building of the intelligent breeder who for years has striven for definite improvement. What can be expected of a "scrub bull"? The very name, a term of reproach and contempt, is an instant index of his utter worthlessness. It is a good investment, an excellent one, and will pay better than anything else on the farm, to put $150 into the right kind of dairy sire, for he will return practically ten times $150 within three years. There will be a gain in milking capacity of his daughters of about 1,000 lb. milk over their dams worth $10 a year. They are likely to be more

persistent milkers, while there will be a marked improvement in the general efficiency of the herd, as the good blood, the better breeding, accumulates. Quality will be remembered long after price is forgotten.

Men seeking real herd improvement should co-operate; 15 or 20 men could club together under a six-year agreement and purchase three good bulls. With the herds in three groups, the members of each group could have one bull two years; then redistribute the sires, and at the end of second two year period change again. Thus there is the use of three good sires for six years each at far lower cost than if each man bought one himself.

Pure dairy type is of utmost importance. Some breeds or animals may produce milk and beef, but not with economy, and net profit is our object in view. A trotter is not expected to haul a load of hay, nor a pampered pug dog to go deer hunting—economic milk cannot be expected from beef type. The sire must not only be pure-bred, but he must be a *good,* pure bred. Mere entry in a herd book is neither a guarantee of personal excellence nor a sound reason for a lofty price. See that the dam and grand dams have been fine producers, and that the sire is a good individual of dairy type, not coarse and beefy. Do not worry delving the archives for records of five or six generations ago. It is the *immediate* ancestry that counts.

The carefully selected sire should be used as a mature animal. A youngster is not ready for general or extensive use till three or four years old, about the age many are killed, but he can continue until ten or twelve years of age at least. Of untold damage, most serious detriment to herd improvement is the young, immature scrub sire running loose in a herd.

Co-operation should rapidly be practiced in this respect. It already is applied, for instance, in hauling milk and exchange of work in filling silo, and can be profitably utilized in the purchase of good sires.

Of mere man, Shakespeare wrote: "The evil that men do lives after them, the good is oft interred with their bones," but fortunately with the mother of agriculture it is not so. The poor cow is forgotten; the good is recorded. Judging by the broad foundations now being laid by our records so recently commenced, one may confidently predict that future students of dairy conditions the world over will be amazed at the excellent attainments of dairy cows in Canada.

Senator Derbyshire: There is the best address we have ever had delivered at any of our conventions. (Applause.) It is practically up to date, and from first hand. He is talking about something that he knows, and I think we ought to question him a little.

The Chairman: Have you any information as to other countries that have adopted this system?

Mr. Whitley: That would be a long story to tell. Other countries have led us in this kind of work, and countries that have taken it up eight or ten years ago have made extraordinary records. You do not expect the Swede to be a high class dairyman, but I do not know of any country in the world that has forged ahead more rapidly than Sweden. They have been at this work ten or twelve years, and they have improved their yield per cow marvellously. They have improved steadily the whole time. They have large herds of cows in Sweden that put our records to shame. This work is spreading rapidly through all the northern sections of Europe, Sweden, Denmark, and Switzerland. In this country the Dominion Government bears the cost of the testing. It is absolutely free to the farmer, while

on the other side men do not hesitate to pay $1 per cow for the information that you are getting here for nothing.

SENATOR DERBYSHIRE: Have they any cow testing associations in this county?

MR. WHITLEY: I regret to say we have not any in this county. Any man who wants to begin the recording simply has to begin, and the Department will furnish you with record forms, and all you have to do is to put down the weight of the cow's milk, morning and evening for three days during the month. You then take a little dipper and put a sample of the milk in the bottle that has preservative in it, and when you have the six samples and the box full you send them into the factory for testing. That testing is done free. The only expense a man has is that of providing himself with scales and a sample bottle, which only costs about six or eight cents for each cow. I do not think you get the best results by weighing three times a month. We have a large number of men who are weighing the milk every day, and by doing that you can tell at once if there is anything wrong with the cow, and you can look for the cause and quickly remedy it.

Q. Do the patrons work out the amount of milk?

A. That is done by the Department free of charge.

Q. Are the farmers weeding out cows who are making these tests?

A. Yes, that is one encouraging feature of this work. Month after month we get these record sheets saying a cow "sold for beef" or sold to John Smith, "he thought she was all right."

Q. Do they keep records of the feed?

A. Yes; this work means millions of dollars to the country, and it means a higher type of farmer altogether.

THE CHAIRMAN: I would like to add a word or two giving a slight experience I have had during the present season. I am not able to give personal attention to the care or milking of my own cows, because I am sent around the country so much that I have to leave that work to my herdsman. I asked him last spring if he would take the trouble to weigh the milk every day and he said yes he would gladly do it. I promised to obtain blanks for him, but I delayed doing so, and he got so much interested in it that he went to work and prepared his own blanks, and he has kept a record of the cows. I have not anything to boast about, because it has not yet reached what I hope it will in the future. But what I feel sure we will do in the future is that we will make a very great increase, because we can already see many advantages in what has been done this year. We have found out that some of the cows we thought were our best have had to take a second or third place, and some we imagined were only second raters have gone up to the front. We have found out that there was not much trouble about taking the weights, and we have taken them every day. I find that the milkers become very much interested in this. We have some three or four milkers, and they have been trying to see how they can keep up their cows and make larger returns. I am sure there are men here who know much more about it than I do, and they will agree with me that apart from the feeding of the cow and apart from the breeding of the cow there is a great deal in the milker. I believe that the dairymen of this country are a little careless right on this point. They think anybody will do to milk the cows, but I have found that there is quite a difference in milkers. I believe that the account we kept this year was of great advantage, and I believe that next year we will commence with better milkers than we did this year because I believe that they learned something. I was astonished when Mr. Publow showed me the returns of the cows in Eastern Ontario for this year. It was only a little over 2,800 pounds, and I felt

very much discouraged. It is altogether too low; it is not over half what it ought to be. My cows were nothing to boast about, they were rather poorly wintered last year, but I got an average from them of over 5,000 pounds. I am not at all satisfied with it and I believe another season that I shall increase that in the neighborhood of another 1,000 pounds per cow and I believe I can do it without any extra cost. But between the average and mine there is a long way, and it would mean an advance of 50% in the returns that would come to the dairymen of this country.

We are all interested more or less in one another and what means prosperity to one means prosperity to us all. We are all interested in the prosperity of the country and why should you not all make up your minds to do better next year, and there is nothing in the world to hinder each one of you from testing your cows.

We have been in the habit of breeding from any cow. I quite agree with what has been said as to the advisability of having a pure-bred sire at the head of your herd. I have been doing that for years, and I can see the advantage of it. By keeping these records I shall know next spring what cows to save the calves from far better than I ever knew before. I believe the dairymen of this country can breed from the very best cows in his herd, and by doing so in time he would have just as good a breed as could be procured from any of pure breeds. I would not advise that method because it would take a long time, but I would strongly advise every dairyman to get a pure-bred sire, and never think for a moment of keeping a herd of cows unless you have a pure-bred sire of your own, unless there is one in the neighborhood. In our locality a number of farmers commenced doing that, and the results are plainly visible. I have neighbors who have been keeping records, who are now sending 8,000 pounds per cow, and that means that some cows give a great deal more than that; because I need not say that there are always some young heifers that bring down the average. I would very much like to have every dairyman here resolve that in the coming year he will keep track of the weight of every cow's milk every day during the season.

Years ago, Prof. Robertson made the remark that if every man who was keeping dairy cows would only keep an account of the amount of milk each cow gave there would be no necessity of having a dairy department at Ottawa. The people would become so educated that there would be no necessity for disseminating knowledge from Ottawa. I do hope and trust that you will take that splendid lecture that we have heard from Mr. Whitley and govern yourselves accordingly.

The next number on the programme is an address from a man whom I am sure needs no introduction to an audience in Belleville. It is not very often that I set out to criticise the Ontario Government, but sometimes I do; and whenever I think of Dr. Publow and the loss this country has sustained by his being allowed to leave the Province of Ontario, and that his service should be lost to the Province of Ontario I feel pretty sore. I am sure that any of you who have known of Dr. Publow and what he has accomplished for dairying in Eastern Ontario will agree with me that this Province has sustained a loss in his removing to the United States, and I hope we will be able to place some kind of embargo upon him to prevent him returning to the United States. Of course they have sent over a couple of men to guard him for fear he will be kept here, and I say to these gentlemen who have charge of him that we are bound to have him back, and will give them fair warning that sooner or later our Ministers will appreciate the loss they have sustained, and they will wake up to the fact that they need such men as Dr. Publow.

DAIRY EDUCATION.

By Dr. C. A. Publow, Cornell University, Ithaca, N.Y.

I think it is about six years now since I was first called upon to make an address in the city of Belleville. Many times have I thought of the day when I visited Belleville Cheese Board when our good friend James Anderson was present, and being a pretty young fellow then, as they say I am even now, I got in a back seat where no person could see me, because I was new in this district. But I was not sitting down very long when Mr. Anderson pulled me out, and got me up to the front for a speech. I remember quite well that I did not see a thing from the time I left the back of the hall till I got up there, and I did not see anything after. I never knew what I said, but I watched for a hole in the floor all the way up and back so that I could get right into it. I therefore appreciate the kind remarks the Chairman said in my behalf in opening the meeting to-night.

However, I feel somewhat relieved in the remembrance of statements made at previous conventions by our honorary President, Senator Derbyshire, to the effect that American speakers were not brought over the line to give us information, but simply to talk, tell stories, and keep up a correlative custom already established. Representing as I do then the American dairymen, I regret exceedingly that I cannot give you the storm and pathos of the American orator, but what I may have to say I must ask you to accept in the simple words of a Canadian boy, who received his training in Canada, and who has not forgotten the interests and welfare of his own country.

Dairy education. What a subject! How many of us ever realize the tremendous importance and extent of this industry that both educates and seeks for education? What an impressive thing it is to see the interests that not so long ago were strictly rural, now being spread to the towns and cities and into the very homes where the least has yet been done but where the most remains to do. The age indeed has surely arrived when necessity demands that not only the farmer but his family and employees, the city man, the merchant, the doctor, the mother, the child, and the mistress of the kitchen all must have a certain amount of this useful knowledge which we include in dairy education. It is my wish to-night to consider this subject in its relation to not only the commercial world but to the social, sanitary and domestic life as well.

Few of us when we look at a herd of cows pasturing in the green fields ever think of anything but cows and milk. Yet, the history of cows and their development through the ages of domestication is one of the most interesting of all agricultural studies. A few centuries ago, cows did not grace the yards of dairy farmers, and their product was not manufactured into such articles as it is to-day. While cows have been mentioned frequently in early history, it is only in comparatively recent ages that they have been of any appreciable commercial importance. On the other hand, the cow represents one of the early types of wild animals. Roaming the prairies of this and other countries they existed and multiplied in their wild state, being provided for solely by the growing elements of nature. They were not bothered by man for eleven months in the year; their only duties were to care for themselves and to furnish sufficient milk for the nourishment of their young

As time went on, however, the cow became a necessity for man in a new way. Instead of having to furnish food for her own offspring she was obliged to furnish nourishment and growth for the children of man, and as is frequently stated, in

this latter accomplishment she has become the foster mother of the human race. Many and wonderful indeed are the results obtained since the domestication of this useful animal. Giving originally only a few pounds of milk per day for only a few months in the year, she has through the skill and science of man become so productive as to give as much as 30,000 pounds of milk in a single season. Entire herds that secreted so little milk that its value was below the cost of the feeds consumed, have through such educational means as daily records, testing-associations and cheaper and better foods become so highly profitable as to pay off more farm mortgages than any other one factor, and to be responsible for the greatest amount of prosperity in the most progressive of the civilized countries.

What a simple, common insignificant looking substance milk to all appearances is, and yet what product of the farm is more valuable when properly treated or the cause of more trouble when subjected to abuse. Consumed by the infant, it nourishes him and builds him to manhood more quickly and more efficiently than any other food. Consumed by the invalid, it gives new strength and restores the life that otherwise would surely perish. Controlled by the art and genius of man, it is manufactured into more products than is any other natural liquid, forming raw material for some of the greatest industries in the most progressive countries, constituting food for the millions, and labor for an equal number. This, ladies and gentlemen, is the white, opaque fluid that brought us to a smile when we cried in infancy, and which also brings us to this convention to-night.

Education produces many results. It makes some of us better and some of us worse, but education to be useful must enable us not only to do things better but to do better things. Education is to man what eyes are to an animal, and the love of knowledge for its own sake is the principal part of human perfection. We have mentioned what dairy education has done for the cow. Let us consider what it has done for some of us.

There is no better monumental evidence to the fruits of dairy education than right at the farms themselves. Here we find substantial buildings, attractive homes, and all the evidence of prosperity that comes from knowing how and doing things. We go a step farther to the cheese factories, and we find the best buildings being managed by the best cheese-makers in the world. Come to the city and you find everyone catering to the men who own the cows. The banker is their servant paid to handle their surplus cash, and the merchant awaits their pleasure. These are the commercial conditions that have come from winning and holding in the midst of keenest competition the preference in the dairy markets of the world.

In the midst of prosperity we sometimes forget the cause or source of our good things, but there are a number of our educational dairy organizations which we cannot forget and to whom an unlimited amount of credit is due. Your staff of dairy instructors who visit the farms and factories constitute the greatest and most useful organization of its kind, reaching as they do the vital places from which success must spring. The dairy schools that graduate annually hundreds of the brightest boys, learned in the details of their own profession, the departments of agriculture with their money and able direction, dairy literature and publications, and not by any means the least, this association, whose value to the agricultural communities can never be estimated, all combined and working in harmony for the best interests of the people on the land. These, ladies and gentlemen, are the agents that through educational means are establishing and maintaining the commercial prosperity of the dairy industry.

When we were younger, some of us went to school because we enjoyed it, others because we were forced to. I have done both. To some of us the word education does not stand for very much, and to others its value is unknown. Things that we get easy we value least, good things come slowly and are always prized. Schools are made to educate and train the mind, but there is one school whose existence we too often forget. How many of us ever stop to consider the great school of life in which we are constantly being taught, where the subjects include those of nature, the human being, the animal, the plant, and where our best teachers are experience, fortune and misfortune, the struggle for existence and love? I tell you friends, we forget these things. Of all the so-called education I have had, the part I appreciate most, has come from this great sky-covered school, and the greatest part of it has come from right here in this district where my classmates for five years included the men who milk the cows.

This class is still going on, and there are many things yet to be learned, not so much in the rural parts, but in the towns and cities. How many of our city people know the actual food value of milk, butter and cheese in comparison with the same amount of meats or other foods? How many understand the meaning of such terms as certified milk, clarified milk, pasteurized milk, ærated milk or any of the other terms printed on the wagon of the milk dealer? How many of our city women knew exactly why milk sours and how such a change can be prevented? The facts are too true the number is small. These are some of the things that dairy education must teach. The housewife must learn that she cannot leave milk on the doorstep for hours in warm weather, that she cannot put new milk into old without encouraging the souring of it all. She must learn that it is not always the much abused farmer who is to blame for the bad milk or cream and the illness of the child. Indeed it can well be said, the care of milk in the household is one of the big problems for dairy education in the future.

All of us were infants at one time, and most of us were obliged to drink milk whether we wanted to or not. But in these later days all infants are not so fortunate as some of us have been. It has been estimated that owing to the effects of fashion both in dress and living, over eighty per cent. of modern mothers have become so affected physically or mentally that they either cannot or will not nourish their young by the means provided by their great Creator. On the other hand, over ninety-five per cent. of all infants must depend for some time at least upon the motherly qualities of the old cow, and she does her part better than either woman or man. Probably man is the worst. Milk never was intended to see the light of day. It was intended to pass directly from the mother to the young for nourishing purposes only, and when this great natural law is violated we immediately find physical depreciation in both human and animal life. The inefficiency of man is most noticeable in our large towns and cities where during the last ten years, of every 1,000 infants born 40 have died during the months of June, July and August from defects in the milk supply, defects due to carelessness and ignorance of some of the many persons who handle the milk from the time it leaves the cow in its pure state until it reaches the consumer. But the death rate is not all. Physicians and mothers too well know the extent of the infantile diseases brought on by impure milk. Then we have the typhoid epidemics that constantly break out, due directly or indirectly to impure milk infected during its handling by man.

But with the bitter we always have the sweet, and we find great successful efforts being made to overcome or avoid these conditions. In some of our cities we find these so improved that the mortality rate has been reduced over 400 per cent.

One can appreciate what this must mean to a great city like New York, where over two million quarts of milk are consumed daily, and where an infant is born every eight minutes during the day. It is not necessary, however, to go to New York, for we have our conditions right at home, and no field offers greater opportunity than does this one concerning which the recently appointed Milk Commission of the province must make its report.

It may be that a certain amount of legislation must be used in accomplishing our best results, but legislation is education in the best form if it teaches how things are to be accomplished and then demands that they are.

Substances that are dead are easy to analyze, but where life is concerned our problems are great. All our efforts and successes, whether they be in the laboratory or on the farm, depend solely upon the question of life, whether it be animal or plant. This is why our research and our study always bring complexity, and why dead persons cannot cope with the live problems of the day. Knowledge is or ought to be power, and we have only to go to those localities where men know most about their industries, to find the greatest power, both financial and mental. This is why the efforts of the dairy educational institutions are reaping power. Knowledge is being carried to the people in so scientific and practical a manner that originality and thought have been awakened. We find the things that were old being renewed, and the things that were unclean becoming clean. The teachings that have applied only to milk and its care are being carried and applied to other problems in the sanitation or cleanliness of domestic life. Indeed, it is doubtful if we can ever estimate, not only the direct but the indirect influence of our dairy teachings upon the general hygienic surroundings of rural and city life. My own opinion is that in recent years no greater blessing has come to the people of our land than this unheralded one of dairy education.

The Chairman: The next number on the programme is an address from C. C. James, the Deputy Minister of Agriculture for the Province of Ontario. (Applause.) It has been said that a man who makes two blades of grass grow where one grew before is a public benefactor. If so, Mr. James is certainly a public benefactor, because I can say without fear of contradiction, and knowing something of what I say, that there is no man in the Province of Ontario who has done as much for agriculture and agriculturists and dairying as Mr. James. (Applause.)

ADDRESS.

By C. C. James, Deputy Minister of Agriculture, Toronto.

In many ways we are making very slow progress in this Province. We have been talking of agricultural education and of the development of agriculture for over twenty-five years and every once in a while we state that we have been making progress. We have made some progress, but the more progress we make, the less we seem to have accomplished because it has an ever-widening horizon. There is no other field of work in the Province of Ontario that has no limitations. You can overdo the iron industry, and some people have told us that you can even overdo the cement industry. Take any line of manufacturing in Ontario or the Dominion of Canada and you can develop it so that you will put it beyond a profitable undertaking. But no one yet has dared set any limitation to the development of our agriculture. The higher up we get the farther on we can see. That is why I say that, after all, we are making progress very, very slowly.

Some people think that we are making wonderful progress in this country. I saw a statement in one of the Montreal papers the other day that there are now one hundred millionaires in that city, and it gave a list of those that have been added during the last year. "A list of men and women in the city of Montreal who this last year have joined the ranks of millionaires." Some people might say, "that is a wonderful thing."

I had the privilege this summer of spending a few days in a couple of countries where there are very few millionaires, but I never visited any country where there was such general happiness and contentment and satisfaction as I saw there. I refer to Denmark and Sweden. There were not many millionaires—you cannot avoid a few in the natural outcome of events—but there was little or no poverty. There you saw an even distribution of wealth that resulted in everybody having enough and the people being fairly well satisfied with what they had. The people were all educated and intelligent, working together, a happy, contented people.

And I said to myself, "This is better than making millionaires. There is something in this country and the working out of the operations set in force, that is far better than we have across the Atlantic, in Canada and the United States, where everything seems to conduce to the production of a few—in fact more than a few—a great many millionaires." There is something worth turning over in one's mind along that line. If the development of our resources and the working out of human operations in this country and the country across the line is merely towards the building up of immense fortunes, I think it would pay us once in a while, as a people, to sit down and consider some of these questions.

Supposing each of us were to write down what we wished for Canada, for the people as a whole, for this year, would any of you wish that it could become easy for a few people to become millionaires. (Cries of "No, no.") Would not that be about the very worst thing that we could wish for the people of this country?

What are we doing? We are not writing down that wish, but is not that what we are doing? Isn't that what the people of this country apparently are concerned about? Or isn't it becoming comparatively easy for that to be brought about?

Someone else writes down, "I would wish that the health of the people of Ontario could be assured, that we might become healthy, strong and vigorous in mind and body." Are we doing much as a people to accomplish that? Certainly within the last few years, but only within the last few years have we become aroused as a people to the importance of public health.

President Roosevelt in one of the most important things he ever wrote, said, "The national health is the greatest asset of the American people," and someone answered that to this effect: "That the United States gave or spent more money looking after the good health of the horses and cows and sheep and pigs than the good health of the human beings of the United States." Of our public expenditures, we have been spending more money in looking after the general health of the animals upon our farms than the health of human beings on the farms. But we are becoming awakened to the importance of that, and so we see all over this country, this question of public health is being taken up and considered and men who never thought of it before are being directed to the importance of it. The result is seen in hospitals and institutions for the care of the sick, institutions for the investigation of tuberculosis and other diseases. This is a movement that certainly ought to receive the support of the people as a whole.

Supposing we were to sit down and write this as a New Year's desire, "That all the people, individually, might prosper," would not that be better than that a

few individuals might prosper at the expense of the multitude? If you gave any sane man the choice between these two, as to whether the few shall be improved or the many shall be improved, there is no question whatever as to which one will be selected, and yet are we doing all that we might for the general improvement and development along financial lines?

What are we doing to help the farmers, the dairymen, the live stock men, the poultry men and the fruit men? $750,000 was the figure we reached for the Province of Ontario the year before last. Someone would say, "That is a large sum." It is about 30 cents apiece for the people of the Province of Ontario. We have over two million and a half in Ontario, we are approaching three million and we are spending 30 cents a piece in trying to help the farmers in this country make a better living. Someone will say: "That is enough; why should we help the farmers of the Province of Ontario?" And a number of answers can be given to that.

I picked up a paper to-day and I saw that $120,000,000 had been left as public benefactions last year, in the United States. That was spread all over the country. It was not given for Agricultural Colleges and Agricultural Institutions. It was spent in the towns and cities. When you find one of these wealthy men of the United States and Canada or Great Britain or any other country putting down a few millions of dollars to help the agriculturists, you can mark that underneath in red. It is the exception, it is the rarity.

Now, this enormous wealth that is coming to these people who make these benefactions is coming to a large extent out of the farming community, but it does not go back there, except indirectly. I have often thought that I would have liked to have had five minutes with Andrew Carnegie when he sat down to figure out his plan as to how he could die a poor man. He finally devised the plan of putting libraries in all the cities and towns in the United States and Canada and other countries. He overlooked the farmers. Libraries were all right for the people in towns and cities. He did not think that if he would only spend some of these dollars in the rural parts of the country that would produce greater results than ever could come from the cities.

The other point is this: It is not right to pick out farmers and help them from a charitable standpoint. We have no more right to help the farmer because he is a farmer than any other man. We have gotten past that. There might have been a time when the whole country was made up of farmers and no others, when the resources were limited and the capital limited; there might have been occasion in those days for us to dole out charity to the farmers of the country, but that day has long gone by. The time has come when we should look at this from a national standpoint, and consider whether or not it is worth while investing the money of the country for the benefit of the country in trying to increase and develop our agricultural resources.

We are beginning to see daylight along some of these lines. They appointed a commission to study the conservation of the resources in the United States this year, and following that up, there has been a commission to study the question of the conservation of the resources of Canada. It is now to be hoped that we will be able to get before the country as a whole and study from a national standpoint, the question of the importance of agriculture to the whole community. Unless it can be proven that the increase of our agricultural resources and the betterment of the farmers' condition is going to result in the general improvement of the whole people, my opinion is that we would not be warranted in going any further, in fact we would not be warranted in spending the money we are spending now.

What is the result of looking at this from a wrong standpoint? Nine men out of ten to whom you talk upon this question will say, "You are doing that to help the farmers." Somebody comes into your office. You are busy. She is collecting for such and such an institution and you wonder how much you can give, how small an amount you can give to that fund, and if you think you can get off with a dollar you will give it, and if it takes five dollars you give that. As a rule, the people of this country have not been trained to give to these charitable institutions with a very liberal hand. And so when we come to consider money for agricultural purposes, we have looked at it, to a large extent, from the standpoint of charity.

But if a scheme comes before the Government of Canada to build a railroad or dig a canal or build a bridge that is going to cost five, ten or fifteen millions, the money is voted and there is little or no trouble about it. The bigger the scheme the easier it seems to be to get the money.

J. J. Hill, the Canadian-American railroad magnate, wrote an article not long ago which has been quoted again and again, in which he advocated spending some of the enormous expenditure for the naval programme in building Agricultural Schools all over the United States, and that has been taken up by a number of important business men. They are beginning to get a new view of things.

The President of the New York Central Railway at a dinner given in New York in the month of November, took up that important point and enlarged upon it and advocated the same thing. President Brown, of the New York Central, knows that if the apple crop of the State of New York is increased by thousands of barrels that the New York Central will have to haul them. He knows that if the garden product is increased, the New York Central will get their share. He knows that if the small fruit crop is increased they will get their share. We are hoping soon to get the Canadian railroads to look at these questions from a similar standpoint. We are trying to do it, but it will take time.

What is the Grand Trunk Pacific being built for, and the Canadian Northern, but to profit from the farmers' work. The development of the great western country is going to mean a great deal for some people in this Province, in Toronto, Montreal and elsewhere. We are trying, in our humble way, to bring these people to understand that there are just as great, even greater, possibilities right here in the Province of Ontario. (Applause). Someone will say, "That is utterly impossible. Surely you don't mean to say here in the Province of Ontario you can grow more than in the Western Provinces?" Certainly we can. There is not any doubt about it. There are enormous areas out there that are good for nothing but wheat, and under present methods, that will play out one of these days. There are certain areas there where they can grow other crops, but you can go through counties, that we might mention, from east to west of this Province where they can produce more than they can produce in the Northwest. Take the country here around the Bay of Quinte. Do you mean to say you cannot produce here per acre more than can be produced on an average in the prairie lands of the West? You are doing it now, and where you are producing one dollar now, you can produce two and three, and if you get your farms up to the producing level of certain parts of France and Holland and Belgium and Denmark and some parts of Sweden and Norway, you can produce five dollars for every dollar you are producing now.

You do not have to go to California or Florida for examples of that. Go to these countries of northern Europe where the people have largely the same blood as we have, same climate, same soil, but hardly as good as ours. They are carrying

on a work of a similar nature to ours. See what they are doing there and then sit down and you will very soon determine that the possibilities of increasing the production of our farms in the vicinity of the Bay of Quinte are almost unlimited.

You can easily see that this question does not concern the poor farmer so much as some other people; the people who have their money invested in railways, stocks and bonds are interested in the development of the agriculture of Ontario. The manufacturer should be interested. The increase in the development of our soils, the increase in our dairying, and the increase in our fruit growing is going to mean more employment, more machinery. And we will have to build over this Province more factories to supply this demand. What about the storekeeper? There is a concentration of storekeeping now that is affecting every town and village, and even some cities in the Province of Ontario. You know very well that in the stores of towns or villages near which you live, there is just one common need and that is trade. The men behind the counter are begging for more trade, and where are they looking for it? They get some, of course, from the people of the towns and cities, but let the crops fail and hard times come out in the country, and what is going to happen? The storekeeper is going to draw a long face and he is going to look again and again at his books and see if he cannot remedy matters.

Now reverse that and let the crops be good, and let money come in and the prices be up, and the farmers have plenty of money in their pockets. The storekeeper will go around with a cheerful smile on his face because good times have come back again. It is of most importance to the storekeepers of this country that agricultural interests should be enlarged. And all professional men, lawyers and doctors and ministers and school teachers, are concerned in this question.

If the farmers were the only ones concerned, I doubt if we would be justified in spending public money to send out instructors to the rural industries. We would say, "Take care of your own business. What do we care whether you have good fruit or not. It is your own fault if you lose." But the people of the cities and towns know very well that it is a matter of importance to them that there shall be a lot of cheese made in this Province of the very best quality that will bring the highest market price. If we can only get all the people to realize the great importance of agricultural prosperity to the whole community, it would be as easy to get the Dominion Government at Ottawa to devote ten millions of dollars for the improvement of agriculture, as to devote ten millions to build a bridge across the St. Lawrence River. They will do the one, but they have not done the other yet.

There is not a word to be said against legitimate expenditure to enable us to get our products to the market and to save in the cost of hauling, to construct railroads and canals and bridges and so on, but if these things are of importance to the country, is it not of equal importance that we spend, fairly and properly, money to develop the material that is to be carried over these highways?

Every once in a while someone gets up on the platform and advises the boy to stick to the farm, and in nine cases out of ten the man who gives the advice was born on the farm himself and did not stick there. He is a man born on a farm in the back townships. His father gave him an education and enabled him to get to town. He became a lawyer or a manufacturer and later on in life he comes out on the platform and advises the boy to stick to the farm. He means well, of course. He is in earnest in giving the advice. But what about the effect of the advice?

I cut out to-day a little bit of poetry from the New York Sun:

"Stick to the farm," says the President to the wide-eyed farmer boy,
Then he hies him back to his White House home with an air of rustic joy.
"Stick to the farm," says the railroad king to the lad who looks afar,
Then hikes him back on the double quick to his rustic private car.
"Stick to the farm," says the clergyman to the youth on the worm fence perched
Then lays his ear to the ground to hear a call to the city church.
"Stick to the farm," says the doctor wise to those who would break the rut,
Then hies him away where appendix grows in bountiful crops to cut.
—(Applause.)

Now it will not do simply to advise the boy to stay on the farm. We might as well save ourselves the trouble. The boy sitting down in the audience sizes up the situation a great deal better than the man who is giving the advice, but if we can show that boy on the farm that there is money to be made there, you would not be required to give him advice. He would see it just as quickly as anybody else. If we can by some means, by education, make it possible for more money to be made on the farm so as to bring in better cash returns, the boy would not be looking at that article which he sees in the newspaper, "So-and-so got $100 for addressing a jury; and Doctor So-and-so got $2,000 for performing an operation; and So-and-so made $500 in some other easy way." If that boy was right up against the proposition of more money coming in, then you would have that matter solved and you will never solve it in any other way.

Agriculture will depend upon its being made profitable, and if we can keep the profits increasing upon the farms of this country, there will not be any great movement from the country to the city. If we leave the thing alone it will right itself. The farmer is bound to come out on top. He has the advantage, because he stays at the source of supply, and instead of paying 25c. a pound for turkeys, you will pay 35c.; and instead of paying nine or ten cents a quart for milk, you will pay fifteen cents; and instead of paying the prices you are now paying for bread and butter and cheese, you will pay fifty per cent. in advance. Why? Because the mass of the people have been crowding to the cities and towns and leaving the few people on the farms to produce the food. It will soon become almost impossible for the ordinary man to live in the town or city and live respectably and comfortably.

It should not be left to work itself out in that way. It is of importance to the people of the cities and towns that the agriculture of this country shall be developed. It is more important to them than to the farmer. That is putting the boot on the other leg, is it not?

The time is coming when the farmer will get more of the luxuries that the people of the towns and cities have. Improvements are being made in the farmer's home and there will be more agricultural papers coming to his house every week. He will have flowers outside his house, and shrubs trimmed up along the fence. He will have his mail left at his door post as do the people of the cities. He will have the telephone in his house. Life will be worth living.

Let the man in the town or city suddenly increase his supply of cash, what does he do? Fixes up his house and makes his surroundings a little more attractive. The farmer will do the same thing, and if the farmer does not do it, his wife will see that it is done. And when all these things happen, the boy and the girl will have no inclination to go off to the town.

Rural development along proper lines means a great deal for the Province of Ontario. It means also a great deal for the morals of the Province of Ontario. The success of our towns and cities depends to a large extent upon their being recruited by the strong, vigorous, honest, straightforward young men and women who come

from the country. We must send in this supply or the towns and cities will certainly go down. The building up in the country of a strong, moral, rural community is a matter of great importance for the future of our towns and cities.

What do we lack most of all in this country? Someone might write down as a New Year's wish, "I wish all the people of the Province of Ontario were strictly honest." Would not that work revolutions in society and in business, if the whole community were morally honest, had everyday honesty? What is it we so much regret in this man or the other man that he does not just come up to that line of strictly moral honesty that we would like to see?

While I was in Christiana, in Norway, this summer, I was taken out to see a hotel out on the mountains, built in Norwegian style. There was one wing fitted up with furnishings from a Norwegian nobleman's house; another fitted up with furnishings from a Norwegian farmer's house. My friend said, "Excuse me, and I will get the key." He came back with the key, and we unlocked the door and walked in. He turned on the light and we walked through room after room. About the walls were most costly ornaments. We turned out the light and walked out again. He went off and handed the key to the maid, and I said, "That is most extraordinary. And he said, "What? " And I said, "That the maid gave you that key. I suppose you know her." He said, "I have not been here for a year." I said, "They would not do that for a stranger in Canada." You walk into a great hotel and ask the man or the proprietor for the key of a storeroom filled with expensive bric-a-brac and then take a party through, and hand it back and ask no question. Some people that we know would have some of the bric-a-brac in their pockets. He said, "We are honest in this country, we trust people." And so they do. I had instance after instance of that common virtue. If we could only get that instilled into the rural and urban communities of this country, we would be doing a mighty thing for the people of this Province.

These things may not appear to you as attractive as building castles in the air or laying out of schemes that will make immense fortunes, but my view is—and the more I look into it the more I have that view—that what this country needs, and upon what its future to a large extent will depend, is the developing along rational lines our agricultural wealth so that our annual production may be increased from two hundred millions to three or four; so that there will be a more even and equitable distribution of wealth; so that our farmers can be better themselves and have better furnished homes and that the farmers' wives may have a less laborious life, that all may be just as comfortable as their brothers and sisters in the towns and cities. What heaven-born right is there that men and women living in the towns and cities should have certain privileges that cannot be had in the rural parts?

The tendency in this Province is that the streams from the rural parts are all leading up to the bigger towns and cities and some men are becoming immensely wealthy just by the rapid increase of value per foot of property in Toronto in the vicinity of the corner of King and Yonge Streets. That is simply the outcome of the wealth of the rural parts flowing into that city. If we can do anything to make it so that the farmers shall have as comfortable homes and the farmers' wives live as well as the women in the towns and cities, if we can help to build up strong, contented, happy, moral communities in the agricultural parts, we shall be doing our duty to those who are living in the country, and we shall be helping in a movement that will benefit all classes, both urban and rural. It is a national question, it should not be considered from the standpoint of dairying or farming. It is something worthy of wider consideration and wider treatment than I think it has yet received at the hands of the people of Canada. (Applause).

Mr. Richardson, Assistant Commissioner of Agriculture for the State of New York, was then introduced. He said: I feel that I should not break the spell that has been placed upon you by the magnificent address given by your Deputy Minister of Agriculture, and I will not at this time and at this hour take your time for anything like a lengthy address. And I wish to assure you that I shall not do so. I am here by the request of Commissioner Pierce, Commissioner of Agriculture for the State of New York, who has asked me to come and express our greetings and felicitations to the dairymen of Ontario, and to say to them that we feel they are engaged to-day in a work the same as we are engaged in, of building up our business and making our business better by perseverance and by attention to scientific methods and to make our business strong and our influence great. We had the great pleasure a few weeks ago at the annual meeting of our State Dairymen's Association of receiving your Dairy Commissioner, Mr. Ruddick. It was a very great pleasure for us to see him, and it is partly as a compliment to him that the Commissioner has asked myself, and my associate Mr. Kirkland, to come up and meet with you to-day. The addresses I have heard since my arrival convince me that your work is going along the same lines as ours, and it is encouraging and interesting to me to know that we are working together in building up our business. We of the great State of New York feel, to-day, like stretching our hands across the River St. Lawrence and Lake Ontario to you agriculturists, to you dairymen of Ontario, and telling you that we believe in the future of this business I was pleased with the words of your president in introducing Dr. Publow of the State of New York. I call him a Professor in the College of Agriculture in our State, and we propose to keep him in our State. If it is necessary we may modify one of the principles of American greatness and establish an export duty instead of an import duty upon Prof. Publow. Again, Mr. President, thanking you for the courtesy of the invitation to extend the felicities of the Department of which I am representing, and thanking your Dairy Commissioner for the invitation to me and my associate to meet with you to-day, I wish you good evening. (Applause.)

FURTHER EXPERIMENTS ON THE CARE OF MILK FOR CHEESEMAKING.

By Geo. H. Barr, Ottawa.

The results of our experiments on the care of milk in 1908 pointed very clearly to the fact that cooling the milk without aeration immediately after being drawn from the cow, gave the finest curds and cheese.

In these experiments, the milk from two farms was made into cheese, members of the Dairy Division taking care of the evening's milk at each farm.

The work was continued during the past season under somewhat different conditions. Instead of using the milk from two herds and taking care of it ourselves, we made arrangements with the proprietor of the Rideau Queen factory to use all the milk suplied by his forty patrons on certain days during the season, and the patrons very kindly agreed to take care of their milk according to our instructions.

Our object this year was to secure further information regarding the care of milk by having the patrons do the work themselves, and if possible, ascertain the loss there was in making tainted and over-ripe milk into cheese.

To carry out these experiments, it was necessary to have two grades of milk delivered each day. We divided the patrons into two groups and by giving each group different instructions in regard to the care of their evening's milk, we were fairly successful in securing considerable difference in the condition of the milk delivered from each, and by using a weighing can with two compartments, we were able to divide and weigh the milk accurately into two vats without in any way mixing the good and the bad milk.

Our instructions in regard to the care of the milk were given by handing the patrons in each group, one of the following circulars:

DEAR SIR:—

On.....
of this week, will you please cool your evening's milk with either water or ice. DO NOT DIP OR AERATE IT IN ANY WAY. Cooling may be done in any of the following ways:

1. Place the milk cans in cold water, and as the cows are milked, strain the milk into the cans, and put the covers on as soon as milking is finished. It will probably require about as much water as there is milk.

2. Place a vessel containing cold water or ice in the milk and put the cover on the can. The outside of this vessel must be kept perfectly clear.

3. Place the milk pails in cold water and when the milk is cool put it in the milk can and put the cover on.

DEAR SIR:—

On.....
of this week, will you please aerate your evening's milk by DIPPING IT FOR 15 OR 20 MINUTES in the place you usually keep it. Don't cool it. Place the cover loosely on the can when through aerating.

DEAR SIR:—

On.....
of this week, will you please put your evening's milk directly into the milk can. Stir it occasionally, but DO NOT DIP IT UP IN THE AIR IN ANY WAY. Don't cool it. Place the cover loosely on the can when through stirring.

DEAR SIR:—

On.....
of this week, will you please cool your milk as you have been doing for us and also dip it well either before or during cooling.

We changed the patrons from one group to another occasionally, so that nearly every patron took care of his milk in all the different ways requested in the above letters.

A record was kept of the temperature of each patron's milk when delivered at the factory and when the night's and morning's milk was delivered in separate cans, the temperature of the night's milk was taken also.

Curd tests were made of each patron's milk every day and each vat of milk tested for butter fat.

The quantity of milk received each day was between 7,000 and 8,300 lbs.

The average temperature of the milk when delivered at the factory was as follows:

Method of Treating the Milk at the Farms.	Number of Samples.	Temp. of Evening's Milk.	Temp. of Mixed Milk.
Cooled without aeration	279	64.88	73.03
Dipped and cooled	30	65.50	74.95
Dipped without cooling	120	67.76	74.06
Stirred without cooling	103	71.86	75.98

There was slightly less than three degrees between the temperature of the evening's milk cooled without aeration and that dipped without cooling when delivered at the factory, and there is less difference in the temperature of the mixed milk, but the table giving the condition of the curd tests shows that the cooled milk was decidedly better in flavor, indicating very plainly that cooling the milk immediately after milking retards the development of injurious bacteria.

Method of Cooling the Milk at the Farms.	Number of Samples.	Temp. of Evening's Milk.	Temp. of Mixed Milk.
Cooled by setting milk cans in water	115	61.77	71.76
Cooled by setting milk pails in water	104	66.37	74.11
Cooled by using shotgun cans	71	67.22	76.24

We had splendid milk from all the above methods of cooling, but as shown in the table, the milk cooled by setting the milk cans in water gave the lowest temperatures and consequently, the sweetest milk.

Effect of Temperature During the Night on the Acidity of the Milk.

Lowest Temp. During Night.	Treatment Given Evening's Milk.	Average Temp. Evening's Milk at Factory.	Average Temp. Mixed Milk at Factory.	When Starter was Added to Milk.	Per cent Starter Used.	Acidity of Milk in Vat when all in.
						%
59.60	Cooled	62.4	71.14	First milk in		.205
59.60	Not Cooled	63.5	71.25	First milk in		.215
63.64	Cooled	62.1	71.63	Milk half in		.200
63.64	Not Cooled	68.57	74.7	None and half in		.215
65.67	Cooled	66.55	75.	First and half in		.202
65.67	Not Cooled	71.30	77.9	None used	....	.220
67.	Aerated and Cooled-	65.5	74.9	Milk half in		.205
67.	Cooled Only	67.1	74.8	Milk half in		.200
70.71	Cooled	67.	74.	At setting		.202
70.71	Not Cooled	73.5	77.7	None used	....	220

When the temperature of the air did not go below 65 during the night, the milk in the vat was overripe when not cooled (.22% acidity), but when cooled, it arrived in sweet condition when the temperature did not go below 71 degrees.

When the average temperature of the evening's milk was over 69 degrees, and the mixed milk over 75 degrees, the milk in the vats was overripe. I would recommend cooling the evening's milk to 65 degrees and if the morning's milk must be mixed with it, I would cool the evening's milk to 60 degrees. It is better to deliver the night's and morning's milk in separate cans if at all possible during warm weather.

Effect of the Temperature During the Night on the Flavor and Texture of the Curd Tests and the Curds in the Vats.

Lowest Temp. During Night.	Treatment given evening's milk.	Curd Tests Clean Flavor.	Curd Tests Solid Texture.	Curds Clean Flavor.	Curds Solid Texture.
		%	%	%	%
59.60	Cooled	83.8	94.1	100.0	100.0
59.60	Not Cooled	62.4	71.8	33.3	33.3
63.64	Cooled	86.8	92.1	50.0	100.0
63.64	Not Cooled	46.7	68.9	50.0	100.0
65.67	Cooled	76.3	79.0	100.0	100.0
65.67	Not Cooled	22.9	50.2	....	....
67	Aerated and Cooled	52.2	55.0	....	....
67	Cooled only	51.0	48.5	50.0	....
70.71	Cooled	79.5	85.0	100.0	100.0
70.71	Not Cooled	31.5	42.1	....	....

This table shows plainly that the temperature of the nights had very little effect on the condition of the curd tests and curds when the milk was cooled, but a decidedly bad effect when the milk was not cooled. None of the "cooled" milk was aerated. The "not cooled" milk was either dipped or stirred without cooling.

Condition of the Curd Tests.

Method of Treating the Milk at the Farms.	No. of Curd Tests.	Clean Flavor.	Solid Texture.
		%	%
Cooled without Aeration	279	77.41	76.00
Dipped and Cooled	30	50.00	50.00
Dipped without Cooling	120	50.83	62.50
Stirred without Cooling	103	54.37	64.07

This table shows a decided advantage in favor of cooling without aeration. There is also another advantage in cooling the milk. There was always a great amount of curdled cream on the strainer from the uncooled milk, especially when it was dipped. No such condition appeared on the strainer at any time from milk cooled without aeration and covered.

Method of Cooling the Milk at the Farms.	No. of Curd Tests.	Clean Flavor.	Solid Texture.
		%	%
Cooled by setting milk cans in water	116	81.03	80.17
Cooled by setting pails in water	98	75.51	76.53
Cooled by using shotgun cans	58	75.86	70.69

There is a slight difference in favor of setting the milk cans in water. Cooling with shotgun cans produced a little more gas in the curd tests. The weak point in this method of cooling is the difficulty in keeping the outside of the cans perfectly clean.

CONDITION OF THE CURDS IN THE VATS.

Method of Treating the Milk at the Farms.	Number of Curds.	Curds Clean in Flavor.	Curds with no Gas.
		%	%
Cooled without Aeration	16	81.25	68.75
Cooled and Dipped	2	.....	.....
Dipped without Cooling	6	.....	33.33
Stirred without Cooling	5	40.00	40.00

The question may be asked how 81.25% of the curds from milk cooled without aeration were clean in flavor, and only 68.75% free from gas. I think most cheese makers have seen curds with a few small pinholes that would be considered clean in flavor. We classed all curds gassy that showed any sign of pinholes.

I also wish to state that although the milk which was stirred without cooling gave better flavored curds and less gas than that aerated, it was in an overripe condition in hot weather when delivered at the factory and caused fast working curds, so that such treatment cannot be recommended in the warm summer weather. In the early spring and late fall when the weather is quite cool, stirring would be all right.

DIFFERENCE IN YIELD BETWEEN 4 VATS NORMAL MILK AND 4 VATS OVER-RIPE MILK. BUTTER FAT AND CASEIN TESTS THE SAME.

	Lbs. Milk.	Lbs. Cheese.	Average Acidity at Setting.	Average Time Setting to Dipping.	Average Time Setting to Salting.	Lbs. Milk to 1 lb. Cheese.	Lbs. Cheese per 1 lb. Butter Fat.
			%	h. m.	h. m.		
Normal Milk	15969	1437½	.21	3 19	7 51	11.111	2.615
Overripe Milk	15715	1401	.24	1 32	7 14	11.217	2.592

Loss per 1000 lbs. milk. .83 lbs. cheese.
Total loss on 15,715 lbs. overripe milk 148.50 lbs. milk.
Total loss on 15,715 lbs. overripe milk 13.36 lbs. cheese.

In handling the fast working milk, we were able to control the conditions possibly better than in ordinary factory work, as we had plenty of help and could attend to all the details in connection with handling a fast curd. I think possibly we had less loss than there is in most factories from fast milk. The greatest loss we had from fast milk free from gas was 5 lbs. cheese in 3,869 lbs. milk.

DIFFERENCE IN YIELD BETWEEN 4 VATS NORMAL MILK AND 4 VATS GASSY MILK. BUTTER FAT AND CASEIN TESTS THE SAME.

	Lbs. Milk.	Lbs. Cheese.	Average Acidity at Setting.	Average Time Setting to Dipping.	Average Time Setting to Salting.	Lbs. Milk to 1 lb. Cheese.	Lbs. Cheese per 1 lb. Butter Fat.
			%	h. m.	h. m.		
Normal Milk.	15311	1366.25	.212	2 58	7 20	11.206	2.638
Gassy Milk....	14673	1294 25	.217	2 50	8 35	11.337	2.582

Loss per 1000 lbs. milk. 1.03 lbs. cheese.
Total loss on 14,673 lbs. gassy milk 169.54 lbs. milk.
Total loss on 14,673 lbs. gassy milk 15.13 lbs. cheese.

The loss in making up gassy milk varied a great deal. One day we had a loss of 10.88 lbs. cheese in a vat of 3,511 lbs. milk, while other days there would be very little loss with apparently as bad gassy conditions. The greatest loss we had from milk both gassy and overripe, was 8.9 lbs. cheese in a vat of 4,469 lbs. of milk. The average loss from gassy and overripe milk was greater than the average loss from either gassy or overripe milk alone.

LOSS OF FAT IN THE WHEY.

From milk cooled without aeration	.20	per cent.
" " cooled and dipped	.22	"
" " stirred without cooling	.22	"
" " dipped without cooling	.24	"
" " in sweet, clean, flavored condition	.194	"
" " in gassy condition	.216	"
" " in overripe condition	.250	"
" " in overripe and gassy condition	.273	"

FLAVOR OF THE CHEESE, 1909.

Method of Treating the Milk at the Farms.	Tested when about three. weeks old	Tested on October 16th.
	Flavor good and not quite clean.	Flavor good and not quite clean.
	%	%
Cooled without Aeration.	93.7	50.0
Dipped and Cooled....	50.0	00
Dipped without Cooling.....	50.0	17.0
Stirred without Cooling.....	100.0	50.0

Cheese made between June 11th and August 12th.

I may say that we had a few cheese that would be called fancy in flavor. I believe the cause was dirty whey tanks and returning the sour, bad flavored whey in the milk cans. The cheese remained in the factory curing room from six to fifteen days, the temperature frequently going as high as 85 degrees, which simply ruined some of the cheese.

The comparison in the above table shows that cooling the milk without aeration gave much better results than exposing the milk to the air. Stirring without cooling gave slightly the best flavored cheese when three weeks old, but we must not forget that this milk was usually overripe and the texture of the cheese was not good.

After two seasons' work, I am quite convinced that no method of cooling the milk will produce the finest flavored milk, or make fine flavored cheese, unless everything is kept scrupulously clean and the cows receive clean, wholesome feed and water.

When the whey is returned in the milk cans, it should be pasteurized and the tanks kept clean. It is simply impossible to have the finest flavored cheese when sour dirty whey is returned in the cans or when rusty milk cans or pails are used. If cheese factory patrons would exercise reasonable cleanliness in taking care of the utensils used for milk and in milking the cows, and then cool the evening's milk immediately after it is drawn from the cow to sixty or sixty-five degrees, with as little exposure to the atmosphere as possible and cover it up, we would have practically no bad flavored cheese to put on the market. Our cheese-makers would be saved much hard labor and worry and there would be thousands of dollars extra in the pockets of both factorymen and patrons.

Q. Would you recommend the ordinary cheese maker to take out a gassy curd in preference to leaving it to go a little higher?

A. I would, because I know I could handle it better myself in that way.

Q. What would you do in case a man had not any more help than he could really get along with, would you prefer cooking?

A. I would take them out because I do not think it is as much work to take them out as to get the water. If you can cut them fine and cut the curds out with a little less acid, you will need no more stirring than in normal curd, and I think the texture will be better. That has been my experience, but if a man is handling another way then I do not know that there is much choice. I prefer doing it the other way because I have always practised that. If I was not able to get that whey off before there was as much acid or a little more acid than the normal curd, then I would wash it by all means.

Q. Do I understand you to say you take the curds away firm?

A. I would take the whey off. I would cut the whey fine and take the curd off before there is much acid, no matter what the condition of the whey, soft or hard, I never find any trouble in stirring the curd and getting the moisture.

Q. Would you use rennet?

A. Yes.

Q. If you had a large vat?

A. Yes. If you can get it out in the same condition as you dip your curd as we do on the curd sinks, I think it is about the same thing. Some of these fast curds we had out in one hour and a half, simply because they did not have very much acid. If we cut fine we do not have to stir them any more than curds we had in three hours, simply because we did not have the acid. It drained out and got away.

Q. Your tests were as between normal milk and gassy milk?

A. Yes, there was a little gas in most of the milk.

Q. You did not make any tests between what we would call ideal milk?

A. It is pretty hard to get ideal milk at Smith Falls' factory, but we got just as bad milk there as I have ever seen. This is gassy milk, not over-ripe, and there were one or two floaters in this. They were in the whey practically the same time. We knew this milk was gassy, but it did not stay any longer in the whey. You can get them out of the whey just as quick when they are gassy as when they are not, by ripening the milk and handling the curd. You see the difference in the time. These were an hour and fifteen minutes longer in getting the salt in, and that is where the loss comes.

Q. How do you account for the loss?

A. That is something I could not account for. Some days we lost 10 pounds.

Q. The worse the milk stinks the less you can get out of it?

A. Yes, sometimes you will have a good deal more loss than other times. The average loss in over-ripe milk was quite as bad or more than the loss in gassy milk. When you get the two together then you get the worst conditions.

Q. If you had a cheese white in texture, what would you do?

A. The trouble is to know how much to get in, without getting it past a poor Manchester cheese. I do not think it is safe to try to make cheese that is dead pale, because it is risky, and you are sure to have a loss in handling that kind of milk, and you will have just as much loss if you let the milk get over-ripe in the vat. I know many cheese-makers simply let the milk get over-ripe before they commence work. It is just as bad to over-ripen the milk in the vat as it is to have it over-ripe when it comes in.

Q. At what temperature do you recommend delivering the milk?

A. In ordinary factory work, I recommend 60 to 65 degrees.

Q. You think the cheesemaker ought to pay for this kind of milk?

A. No, I do not. Often you will take in milk that is bad and you can not detect it in the cans by the whey stand. We took in milk last year that I would not send on any consideration in our factory work, and when it was made into curds we would get poor conditions.

Q. A cheesemaker ought to be able to see a rusty can?

A. After two years' work, I am convinced that there is no method of cooling the milk and taking care of it on the farm that will produce fine milk unless everything is kept scrupulously clean and the cow receives good wholesome food and water. I think it is impossible to have the finest cheese when the tank at the factory is dirty and sour, and the whey stinks when it goes home in the cans. On the other hand, I am just as convinced that if our cheese factory patrons will cool the evening's milk down to 60 or 65 degrees as soon as it is taken from the cow, and cover it up, he will have practically no bad flavored cheese to put on the market. Our cheesemakers will be saved an endless amount of time and money, and it will be thousands of dollars in the pockets of factorymen and the patrons.

Q. Are you thoroughly satisfied we can make more cheese from it?

A. I thought I was going to get out of that. There is just one thing about this butter-fat business that is rather a surprise to me. I do not know that you are always sure of making any amount of cheese from any amount of butter-fat all the time. One of the strange things about our work during the past two years

is that we are not able to make as much cheese from 3.5 per cent. fat in milk in August as we were from 3.2 and 3.3 per cent. fat in milk in June. If anybody would give me a solution, I would like to have it.

Q. At the same time, did you make more cheese from 3.5 per cent. fat in milk in August as you did from 3.2 per cent. fat?

A. We did not have any 3.2 milk in August.

Q. You are just speaking from vats and not from individual herds?

A. Yes, just from vats. It took more milk to make a pound of cheese in August when the milk was testing 3.5 per cent. fat than it did to make a pound of cheese in June when the milk was testing 3.3 per cent fat.

Q. Was that under favorable conditions?

A. When the milk was just as good in one case as the other as far as I could see.

Q. What was the condition of the feed; any drought?

A. This year the conditions were pretty favorable.

Dr. Publow: My record in New York shows the same thing, but I have been able to trace the difference to dry feed, and the most remarkable results have occurred at the time when the country was dry and there was a lack of rain. I think I have about twelve hundred samples that proved up in that same way, and as far as I have been able to learn it has all been due to that fact. I had casein tests and fat tests, and in August I found the abnormal relationship between the fat and the casein quite sufficient to demonstrate to me that that was the cause of the difference in our yield of cheese; and at the same time we were troubled more or less with a little greasiness in our curds.

Q. Did you find the curds were hard to thicken?

A. Yes.

Q. Do we not nearly always have better conditions in June than in August?

A. Naturally, conditions are usually better in June than in August. We cannot get over that, and it has always been rather a surprise to me, because I have said before I did this work that if the patrons would send us as good milk in July and in August as they do in May and June, we would make just as many pounds of cheese from as many pounds of milk. Now, I would not say that to-day, because we cannot do it. We are getting as good milk in August as we were in June, and we could not make as much cheese; therefore, I have got to take back what I used to say.

Mr. Ruddick: I would like to say one word in regard to the yield of cheese from milk at different times of the year. I do not think we can put such stress on that point in connection with paying by test at the factory, because when you pay by fat test you are paying under exactly the same condition and not comparing one month with another, so that it does not have very much bearing on the question of paying for milk by the test.

A Member: Did you find any difference between 3.4 milk and 3.5 milk in August?

Mr. Barr: I cannot say off-hand, but I will try and answer that question another time. There is no doubt you would make more from 3.5 per cent. fat milk than from 3.2 per cent. in August, but the question in my mind was, why we make less cheese from 3.5 per cent. fat in milk in August than we did from 3.3 per cent. in June?

REPORT OF CHIEF DAIRY INSTRUCTOR AND SANITARY INSPECTOR.

By G. G. Publow, Kingston.

I take pleasure in presenting my seventh annual report as Chief Dairy Instructor and Sanitary Inspector for Eastern Ontario.

There was practically no change in the manner in which the work of instruction and inspection was carried on this season, and so the general outline of my report cannot be changed very much.

The same number of instructors were engaged, but owing to my appointment as Superintendent of the Kingston Dairy School and taking charge of the creamery work this season, my duties were so increased that it was found necessary that I should have an assistant in the work, and Mr. J. F. Singleton was selected for this position. He was given charge of a number of the creameries, and also assisted me in the general work of syndicate inspection. I may say that his work was very satisfactory, and I found it a great advantage to be relieved of much of the detail work that previously required so much of my time.

The instructors under my charge were the same as last season with the exception of Mr. McKinley, in Ottawa East district, who replaced Mr. Villeneuve, who resigned early in the season to accept a similar position in Manitoba.

As has been the custom in the past few years, the instructors took a special course of instruction at the Eastern Dairy School, where lectures were given in bacteriology, dairy chemistry, and factory sanitation, as well as in cheese and butter-making, and considerable time was devoted to a discussion of matters pertaining to the season's work.

Rather than weary you with a detailed statement of each instructor's work, I have prepared a tabulated form showing in a concise manner what has been accomplished, together with other interesting information pertaining to each district.

From this summary it will be seen that there were 24 instructors and sanitary inspectors who had 950 cheese factories under their supervision.

Full-day visits to the number of 1,641 were given to these factories and 5,170 call visits, making a total of 6,811. We find this visiting the factories at short intervals a great factor in keeping the cheese of uniform quality throughout the season. They also enable a more frequent sanitary inspection, and this results in the factories and surroundings being kept in a much better condition than they otherwise might be if inspection were not so frequent.

I am pleased to be able to report a very marked improvement in the sanitary condition of the cheese factories this season, as of the 950 regularly inspected 844 were reported as kept in a satisfactory condition.

The instructors did not confine their attention to the conditions at the factory however, but devoted considerable time to visiting the farms of patrons who were delivering milk to the factory in an unsatisfactory condition.

The farms of 3,356 patrons were visited and inspected, which is an increase of 675 more than last year. This I consider to be a very important feature of our work, as the quality of the cheese is largely determined by the condition in which the milk is delivered to the factory. It is gratifying to be able to report that there was a marked improvement generally, in the condition in which the milk was delivered this year, but notwithstanding, tons of milk were rejected at

the factories owing to lack of proper cooling and the unsanitary conditions under which it was produced.

With very few exceptions, the patrons received the assistance and advice of the instructors in a friendly and appreciative manner and in practically every case the milk was delivered in better condition after the instructor's visit to the farm.

Another means we employ for the instruction of the patrons along these lines, is the sending to the annual meetings of factories, competent speakers, generally the instructors of the local syndicates, who as a rule, are best acquainted with the local conditions in their own respective districts, and can tell their patrons what their particular difficulties are, and how best to remedy them.

As an evidence that this work is being appreciated, we have had to supply speakers to over 100 of these meetings already held since the factory season closed, and the speakers report a much greater enthusiasm in the subjects discussed than ever before. Right here I would like to commend Mr. Ruddick, Dairy Commissioner, and his staff, for the excellent work they are doing in this respect.

The number of patrons delivering milk to the cheese factories was 35,019, which is 1,782 less than last year, and the number of cows from which milk for cheese-making was obtained was 334,831, about 6,000 less than last season. But notwithstanding this falling off in the number of patrons and cows, the amount of milk delivered to the cheese factories from May 1st to November 1st was 485,195 tons, 709 lbs., which is an increase of 25,341 tons over the amount supplied last year. The average yield per cow for the six months was 2,863 lbs., an increased yield of 163 lbs. over that of last year, and the average per cent. of fat in the milk for the six months was 3.66, which is practically the same as last season.

The total output of cheese from May 1st to November 1st, was 90,170,874 lbs., the average amount of milk required to make a lb. of cheese being 10.76 lbs.

This is an increase of 4,360,965 lbs. for the six months from 6,000 cows less than last year, which at the average selling price of cheese for the season amounts to $697,754.35.

The testing of milk for adulteration was also conducted by the instructors, 41,412 samples were tested by lactometer and Babcock tests, and of this number 141 gave indications of having been tampered with. After a thorough investigation had been made, 107 cases were handed over to the official prosecutors engaged by the Eastern Ontario Dairymen's Association to be dealt with.

Convictions were obtained in all cases and fines were imposed on the convicted parties of from $5 to $50 and costs, amounting in all to $2,405.00. Of this amount $1,207.34 was paid over to the treasurer of the E.O.D.A. and $1,197.66 to the treasurers of factories in which the offences were committed.

The number of factories paying for the milk according to test is only 86, or 1 less than last season.

It is very gratifying to note the continued improvement in the factory buildings and surroundings, as of the 950 factories under my supervision, 844 were kept in a good sanitary condition throughout the season, and the foul smelling, dilapidated buildings, which used to be so common, will evidently soon be things of the past, as factorymen are making the required improvements about as quickly as the profits from their business will warrant.

Twenty-seven new factories were built this season and 493 made improvements in buildings or plant. The estimated expenditure including new buildings amounted to $136,542.00, which is $5,847.00 more than the amount expended last year in this way.

While speaking of the factories, I would say that their weakest point, as a rule, is the lack of good facilities for controlling the temperature of the curing rooms throughout the different months of the year, and it is to be hoped that the patrons will soon come to realize the benefits to be derived from having a uniform low temperature for the curing of their cheese, and that they will co-operate with the manufacturers in providing the proper facilities.

Regarding the manufacture of butter from the whey, I might say that it is on the increase as the number of factories engaged in it this year was 119 as compared with 63 last year. The yield of butter showed a wide variation of from 3½ to 7½ lbs. per ton of whey, the increased yield being obtained when the milk was delivered in an over-ripe and gassy condition. The great bulk of this butter is used by the factory patrons, the price paid being about the same as for creamery butter, the majority of patrons expressing themselves as being fairly well satisfied with the quality.

The number of creameries in operation in Eastern Ontario this season was 28, which is 1 less than last. They are, with two exceptions, all operated on the cream-gathering plan.

Mr. Singleton acted as instructor and inspector for 16 of these creameries, the others being looked after by the cheese instructors in whose groups they happened to be located, this being thought to be the most satisfactory and economical way of reaching them, owing to the fact that they are so widely scattered throughout the different districts.

There does not appear to be the same enthusiasm in dairy matters among the creamery patrons that we find in the cheese-making districts, and this is not to be wondered at from the small yield of butter per cow that is evidently being obtained.

While we have not been able to get full statistics for this report, as we have received complete returns from only two-thirds of the creameries, our estimate is based on the reports of those received, which can be considered as being a fair average.

It would appear that the number of cows producing milk from which cream was supplied to the creameries was about 10,200, and the yield of butter per cow for a period of six months from May 1st to November 1st was not more than 90 lbs., or less than 4 lbs. per week, which is indeed a very low yield.

Practically none of this butter was exported, as it was all required for local use. The average selling price for the season was about 23½ cts. per lb., and the quality of the butter on the whole was reported as being very satisfactory. However, as Mr. Singleton is to speak specially on the creamery work, I shall not go any more fully into this subject.

I am glad to be able to report an increase in the number of factories that practise the pasteurizing of the whey, there being 63 doing so, as compared with 26 last season. When the whey is to be returned to the farms in the cans in which the milk has been delivered to the factory, pasteurizing, when properly done has much to commend it. There are many benefits to be derived from it. The whey is returned in a much sweeter condition, there is a more even distribution of the fat, the cans are much more easily cleaned, and it prevents whey tanks at the factory becoming the seeding centre for many undesirable fermentations. It has also been proven to be one of the best methods we have tried for keeping the whey tanks in a more sanitary condition.

During the season we had Dr. Connell, our bacteriologist, carry on an investigation for the purpose of determining the efficiency of the methods used, and as he is

to report specially on the result of his investigations, I will leave this important matter for him to deal with.

In reporting on the quality of the cheese, it is very gratifying indeed to be able to say that the average quality has been of an exceptionally high standard, and although the makers met with good deal of difficulty, fewer rejections were reported than in any previous year. The most common defects in the cheese complained of were openness of make and flavor not clean. Very few complaints were made regarding acidy cheese, and the improvement in this respect has been very marked. Some complaints were made regarding the finish and the inequality in the size of the cheese. While the average maker has made a marked improvement in this

Name of Instructor.	Syndicate.	No of factories in syndicate.	No of full-day visits given.	No. of call visits given.	No. of patrons.	No. of patrons visited.	No. of cows from which milk for cheese making was obtained.	Average yield of milk per cow from May 1st to Nov. 1st.
A. McDonnell	Alexandria	36	70	180	1,063	15	10,352	2,684
W. J. Ragsdale	Almonte	40	81	166	1,576	144	14,554	2,573
H. Howie	Belleville	39	74	143	1,879	316	17,058	3,132
A. H. Wilson	Brockville E.	47	94	139	1,762	42	17,510	2,808
P. Nolan	Brockville N.	45	62	201	1,009	25	14,091	3,301
S. S Cheetham	Brockville W.	42	92	169	1,044	164	14,275	3,206
R. T. Gray	Campbellford	40	85	228	1,608	105	15,361	3,249
T. J. Ellis	Chesterville	38	37	290	968	15	14,988	3,069
J. Buro	Cornwall	37	52	311	1,131	30	12,960	2,659
C. B. Larry	Finch	39	51	186	1,200	91	11,724	2,869
W. G. Gardiner	Kemptville	43	98	239	1,664	123	15,410	2,759
H. Brintnell	Kingston	40	107	170	1,112	76	14,019	2,931
D. J. Cameron	Lindsay	30	46	187	1,657	150	11,530	2,545
J. B. Lowery	Madoc	34	87	142	970	376	9,975	2,469
C. W. Norval	Morrisburg	42	71	252	1,284	40	14,124	2,927
Geo. Bensley	Napanee	42	76	204	2,927	60	25,305	2,819
W. W. Dool	Ottawa	37	64	276	954	29	10,272	2,512
A. McKinley	Ottawa E.	41	84	195	1,186	183	11,459	2,789
R. E. Elliott	Ottawa W.	36	42	164	1,467	209	10,905	2,357
J. H. Echlin	Perth	38	29	200	1,520	93	10,640	3,029
R. W. Ward	Peterboro	36	76	352	1,634	489	12,893	2,952
T. E. Whattam	Picton	36	59	304	2,938	426	21,695	3,210
J. Charbonneau	Plantagenet	46	47	241	1,249	52	10,450	3,256
W. G. Graham	Vankleek Hill.	46	57	230	1,217	53	13,281	2,602
		950	1,641	5,170	35,019	3,356	334,831	2,863

respect, we have still too many who do not exercise sufficient care regarding the appearance and uniformity in the size of their cheese, and this defect is not excusable as it is entirely under the control of the maker.

I am pleased to report that the efforts we have been putting forth to put the dairy business on a more substantial and prosperous basis in Eastern Ontario, are beginning to show very encouraging results. Among the factorymen we find a greater enthusiasm and confidence in the work than ever before. The new factories they have erected have an appearance of permanency about them, and the improvements made in various ways go to show that they feel confident that the future of the industry warrants the expenditure they have made.

Among the patrons we find equally encouraging results. Driving through the country, one cannot fail to notice the great improvement in the farm buildings, and the provisions that have been made for a better housing and feeding of the stock; and it would appear that these improvements are being made with a view to specializing in the production of dairy products, and as an evidence of this, I may say that during the past summer alone 1,070 silos were erected, and I doubt if there were ever so many new stands, with facilities for cooling the milk, erected in one season. Greater attention is being given also to the selection and care of the dairy herds and everything points to an increase of interest and further improvements on the part of those who furnish the raw material.

Average per cent of fat in milk from May 1st to Nov. 1st.	No. of lbs. of cheese made from May 1st to Nov. 1st.	No. of curd tests made.	No. of tests for adulteration.	No. of samples adulterated.	No. of factories which pasteurized the whey.	No. of factories manufacturing whey butter.	No. of factories which pay by test.	No. of curing rooms in which temperature can be controlled.	No. of new factories built.	No. of factories which made improvements in buildings or plant.	Estimated expenditure for improvements including new buildings.
3.70	2,615,173	102	930	6	0	0	2	0	1	15	$ 3,150
3.68	3,465,763	316	2,056	3	2	1	1	1	0	36	4,500
3.72	4,692,022	53	1,759	8	1	0	0	6	1	4	5,500
3.49	4,445,079	133	1,604	2	14	13	4	1	1	33	9,995
3.70	4,269,721	75	1,301	1	9	10	0	2	4	31	12,535
3.59	4,186,814	310	1,602	10	6	10	4	3	0	26	10,921
3.63	4,560,242	124	2,495	5	2	1	0	1	2	23	6,025
3.62	3,993,580	25	1,022	2	2	9	11	0	1	12	3,500
3 76	3,260,663	322	865	10	7	1	15	0	3	26	7,159
3.60	3,192,427	60	1,500	6	1	2	0	2	2	13	4,864
3.59	3,917,143	71	1,510	3	2	5	10	0	1	22	6,510
3.80	3,815,141	164	2,532	13	4	6	0	0	2	2	3,400
3.54	2,702,777	62	1,950	2	3	1	1	0	0	21	1,200
3.77	2,496,075	74	2,893	2	0	0	0	2	0	23	1,888
3.67	4,101,343	56	1,775	3	1	18	2	0	0	31	5,120
3.58	7,117,374	40	2,186	3	1	5	0	4	1	15	5,700
3.56	2,425,070	47	1,178	0	2	6	8	1	1	12	3,225
3.80	3,118,919	181	1,666	4	1	5	10	0	2	10	5,775
3.52	2,421,588	107	850	6	2	3	1	5	1	35	6,847
3.72	2,984,080	69	1,884	2	1	5	0	0	1	7	2,735
3.58	3,384,844	53	1,513	4	0	7	14	3	1	28	6,351
3.73	6,466,566	144	2,980	13	2	11	0	14	0	30	8,200
3.84	3,256,917	200	1,740	12	3	0	2	2	1	19	6,742
3.70	3,281,553	34	1,531	21	6	0	1	1	1	19	4,700
3.66	90,170,874	2,822	41,412	141	63	119	86	48	27	493	136,542

I believe we have just finished the most successful year in the history of our instruction work, and in concluding my report on the same, I want to express my appreciation of the conduct and work of the instructors. They at all times showed a willingness to carry out my wishes, and they have put forth an honest effort to bring about improvements in their respective districts.

Q.—Give us the cost of the pasteurization of whey under ordinary conditions.

A.—About 75 cents per ton of cheese. We made some experiments at Kingston at the school last winter, and it ran all the way from 50 cents to $1. To pasteurize economically you should have a large boiler.

Q.—How close should it be to the tank?

A.—About thirty feet. I call that close. The cheapest way this year was where the factory had an engine, and used the engine for pumping or stirring the curds. You put the condensed steam from that engine into the lower tank, and the whey was then lifted with an ejector. If the condensed steam does not raise up the steam to 125 degrees, they put in live steam, and then eject it.

Q.—Where the whey is not returned in the morning, do you think it would be advisable for feeding purposes to pasteurize the whey?

A.—Yes.

Q.—Do you pasteurize in the lower tank or the upper tank?

A.—Where you have an engine and an ejector, it is better to do it in the lower tank, heat to 120 degrees and then eject.

Q.—Would you finish in the lower tank outside?

A.—Yes, or if you eject from that again. I think that is one thing that more attention should be given to, and I really believe when the farmers of this country come to realize the benefit of pasteurizing that the manufacture of whey butter will stop.

Q.—Should this whey be kept warm after pasteurizing?

A.—No. Once pasteurized is sufficient, but you must take this precaution, that nothing gets into it. Some men pasteurize it, and then run in the washings of the floor. That is not right.

Q.—Would the tank require to be cleaned out daily?

A.—Yes; it is better to be cleaned out and the whey all run off or taken away. You will have a higher percentage of acid in the whey if you do not do that.

Mr. McGrath: Mr Publow mentioned having well qualified speakers at the annual meeting of cheese factories. It seems hard to get the producers of the milk to understand how they are interested in the factory. A great many are under the impression that when they take the milk to the factory that is about as far as they are concerned. A great many patrons have said they were surprised that they were so much interested as Mr. Publow explained to them. He explained where their losses were. I think the Association or the Department should not stop with what they have done with regard to getting speakers at meetings. I think it is the best way to reach the producers of milk.

The Chairman: That is all right, but I think the Department is doing everything in its power. They are sending out circulars to every factory, as far as I know, saying they will get a speaker if they want one. But I am sorry to hear that only a small percentage of those factories have replied to the circulars. The suggestion that Mr. McGrath has just made, that more interest would be taken by the patrons of cheese factories if they had a speaker at their meetings is correct. So far as my experience goes, it is the best place to reach the patrons.

A Member: I would suggest that the speakers at these annual meetings be given the same chart as Mr. Barr has used here. These charts have a splendid effect. They are more convincing than even the word of the speaker. We ought to try and have some of these charts present, and I think if all the speakers could be furnished with a chart it would have a better effect. It would also be a good thing if the factory owners would have an oyster supper, or some other like festive feature. I have attended some meetings where every patron was present.

Q.—Do you pasteurize the whey immediately after drawing from the vat?

Mr. Publow: Yes.

ADDRESSES OF WELCOME.

Mr. L. W. Marsh, Mayor: It has been my pleasure during the last twelve months to welcome to this city several conventions, and it is one of the greatest pleasures I have ever had to welcome to the City of Belleville a body such as the Eastern Ontario Dairymen's Association. I say that advisedly, because I have some personal connection with the Association in the way of manufacturing, and because this Association is doing so much towards the developing the common interest of our country, and the country is only built up as its commercial interests are built up It seems to me that Belleville is the natural point at which conventions of this kind should be held, on account of its being the centre of one of the largest dairying districts in the province. We are very glad to see you here and want to congratulate your body on the excellent programme that you have before you. I do not think that I ever saw a better one arranged. It is my pleasure on behalf of the citizens of Belleville to welcome you officially to this city. We hope that your deliberations will be profitable and pleasant and that you will have a good time, in fact that you will have such a good time that you will make up your minds to come back to Belleville in a very short time. If you get too exuberant, come and see the Mayor, and he will see that everything is all right. (Laughter and applause.)

The Chairman: I have now much pleasure in introducing my colleague, Mr. Johnston, the local member of the Ontario Legislature, who is no stranger to a Belleville audience. I take this opportunity of expressing my gratitude to Mr. Johnston for the help that he has always given me in the Legislature in connection with any project that I had to advance in the interest of the dairymen. Mr. Johnston is not a dairyman or a farmer, in the sense that we usually speak of them, But I have to say that I am disappointed sometimes that more of our farmers, members in the House, have not given me the same amount of assistance that I thought I was entitled to, and not nearly as much as I received from Mr. Johnston and a few others of his kind. I think it is only right that I should make public acknowledgement of it, and to say that we owe to Mr. Johnston a debt of gratitude for the assistance that he has given to our Association, and to the cause we have at heart.

John W. Johnston, M.P.P.: I believe that this is the thirty-third anniversary of the existence of the Eastern Ontario Dairymen's Association. That is a fairly good age in this country of ours. Your Association has proved its right to exist, and it is fully and finally accepted. I noticed last night, that notwithstanding all these years of education and association together you still need to be preached to. The same thing is true of the church. Some of us are moral, but it requires a sermon or two every Sunday to keep us right. And I suppose it is the same with the dairymen. You require to have these leading men who have the technical knowledge, to give you instructions from time to time in order that you may not fall below the standard. I had the pleasure some twelve years ago, when I held the position of Mayor, to welcome this Association, and I have followed its career and the great industry it represents ever since. I congratulate you upon the position that it is holding in the community. It is not what you think of it, but what the great community thinks of the industry that you represent. There are certain reasons why we, in the city of Belleville should welcome you, owing to the importance of this industry. We can recollect the time when our friends to the south, through the McKinley tariff, seemed to have killed the agricultural industry of the Province of Ontario, but what seemed to be a great disaster is turning out to be a blessing in disguise. I honor you men for the position you took, and the work you have done

in meeting the difficulties that then arose. You have carved out for yourselves, by the excellence of your products, a way to the British market, and have captured that market and made it your own. That is one reason why I welcome you here. I am not only welcoming you as a citizen of Belleville, but I am welcoming you as a representative of one of the ridings of the great County of Hastings, and I think that I may safely include the County of Prince Edward and all the Bay of Quinte shore. We welcome you because of the lessons we have learned from your methods and system and order, and co-operation that has made your business a success.

What is education? It is simply a repetition. When a man begins to etch a steel or copper plate for the purpose of making a beautiful picture the first impression or two does not amount to very much. But a beginning has to be made, and as the skilful artist goes on day after day and week after week, and he finally has it completed and at any time he can produce from that plate a magnificent book. So it is with following up the best there is in any industry in this great country of ours. Patient toil alone will bring the results that are desired. I welcome you on that account and I welcome you for the other reason that we all derive a profit from your industry. There is not a man in this community, or in any urban community throughout the whole Province of Ontario, who does not derive some practical benefit from the great industry with which you are connected. I welcome you because of the personal interest we have in the industry that you are carrying on, and also I welcome you because we will have a good time together. "As iron sharpeneth iron, so does the countenance of a man his friend." "It's always fair weather, life slips its tether, when good fellows get together"—good fellows such as compose the Eastern Dairymen's Association.

Milk is indispensable, as we heard last night from the Deputy Minister of Agriculture, whose work I have watched with great interest, and who is a credit to the Province of Ontario. (Applause.) I have never heard a man who had the facility of expression and the knowledge back of the expression, that conveyed the fact that he knew what he was talking about more than has Mr. James, the Deputy Minister of Agriculture, and he is always ready to come when he is called to any meeting to further the interest of the great cause of agriculture. Milk is indispensable. There are some things that will never go out of fashion. You will never reach the limit of this industry. Bread and milk will never go out of fashion, and bread and cheese will never go out of fashion, not only in Canada, but thoughout the whole civilized world. That industry is in demand.

There is no man in the house of Assembly in the Province of Ontario who is more thoroughly esteemed and whose judgment is more confided in than the member for Leeds, Mr. J. R. Dargavel. (Applause.) If you wish to show your good judgment and your good sense, I would not want to see anything more than the fact that J. R. Dargavel is filling this chair this afternoon. If you get a man of that type at the head of this organization there is no danger that it will ever fall below the standard to which you have raised it.

I am going to take the opportunity this afternoon of saying a few words to this intelligent audience about New Ontario. It was touched upon last night by Mr. James.

I had the privilege in the month of September last of visiting what we know as New Ontario. If I had been speaking to an audience prior to the month of September, I very likely would have said, "If our farmers cannot get a farm in this Province the only thing to do is to go to the North-west." I would not say

that to-day. I have changed my perspective entirely. I say the opportunities that exist in the new portion of our Province are infinitely superior, in my estimation, infinitely superior to anything that can be offered to our Canadian farmers in the North-west Provinces, and I have reached that after very careful consideration. No man need pass by this great Province of Ontario in order to find an opportunity of tilling the virgin soil.

When we went a hundred miles north of here we used to think we were at the limit of civilization, and that there was nothing left after we got to the northern part of the County of Hastings, Peterborough, Lennox and Addington.

I travelled 500 miles north of the city of Toronto, and when we reached Cochrane, the junction of the Grand Trunk Pacific with the Temiskaming and Northern Ontario Railway, we were then only 170 miles from the Hudson Bay, and it will not be much of a task to continue the Government owned railway to Hudson Bay and give an opportunity for the produce of that great country to reach tide water in another way than by the St. Lawrence.

This province of Ontario is four times larger than England, six times larger than Ireland, and seven times larger than Scotland. It is the greatest heritage that any people in this world possess. Up in the northern country there are sixteen million acres of land which is known as the great clay belt. And that clay belt is alluvial soil. It is covered with the woods of commerce, and is indented with lakes and rivers, bays and valleys, full of wood ready to be made into timber.

We saw the fair at Englehart, which is one of the stations on the T. & N. O., and let me add this, that there never was a wiser project of any administration in this Province than that which was put into operation by the Hon. G. W. Ross's Government when he built a railway from North Bay up into New Ontario; and there never was a wiser scheme than that which put the administration of it into the hands of an independent Commission into which no politics can enter. This railway is being run to serve first of all the people of that new part of the Province, and incidentally to bring money to the treasury of the Province of Ontario; and there is not a better built railway, not only in the Dominion of Canada, but I venture to say on the whole American continent, than that railway that is owned by the people of Ontario.

Now, what I saw at this fair at Englehart, spring and fall wheat and rye and barley, for instance, was just as good as you ever raised on the best 100 acres of land in this section of the older part of the Province of Ontario. On that soil you can raise anything that can be raised in the southern part of the Province of Ontario, and the climate is just as fine as this portion of the old Province. We read the other day that the thermometer had dropped to 52 degrees below zero in Saskatchewan. Such a thing never occurred in the Province of Ontario in all its history since civilized man came here. And while they may possibly have a trifle colder weather up north, yet after the land has been settled and drained they will have just as genial a climate as ours at the Bay of Quinte. The markets are already there. If a man takes 160 acres of land there is standing upon that land spruce wood, the most valuable timber we now have, and even finer than white pine used to be. Mills are being started to make paper almost entirely from spruce, and the spruce comes from the Province of Quebec and the northern portion of the Province of Ontario. When a man clears 160 acres, he can calculate that he will get enough for his spruce to pay for the entire clearing of the land, and the stumping can be done with one team. We want to see the stream of immigration diverted from the North-west Territories. A man must first of all be kind to his family and his own town and his own Province. There is a touch of home in New Ontario that is largely lacking in the prairie provinces.

Can you fancy a man living on a bare prairie? In New Ontario you can get the hemlock, the tapering spruce and the maple, and a soil that is set in lakes and framed by bays and rivers on which he may send or carry his produce to the Hudson Bay and from there to the markets of the world. That is what you have in New Ontario. You have a landscape and a waterscape which are totally absent to the great prairies, and this is what the son of Ontario will get up in that country. The Canadian Pacific Railway and the Dominion Government have brought the stream of emigration from the old lands to the North-west, and the older provinces of New Brunswick and Nova Scotia and Ontario have not had a chance of getting a great many of the emigrants owing to the great power of the Canadian Pacific Railway and the Dominion Government; but now it is the duty of the Government of these provinces to assert themselves and see that they get some of the grand old people of the old land, from which we have all sprung. I believe we will get them in the future more than we have in the past. We should colonize New Ontario instead of the North-west Provinces.

At the present session of the Dominion Parliament there will be a decennial revision of the Banking Act. You may think that a very extraneous subject to introduce at this time, but I do not think it is. If there is one thing that the agricultural class are interested in more than another, it is an independent audit of bank books at the head office. There were $829,000,000 on deposit in the banks on the first of January, 1910. That is 135 millions more than there were last year, and that is largely due to the savings of the agricultural class of the Dominion of Canada. You leave your money in the bank and you get interest upon it. But the banks do not keep it long in their vaults. They are lending it out, and it is your money that is doing this work. It is being lent into other lines of industry, and it is your duty to see that the bank is carried on in the right way. The inspection of the branches of the bank by its own officers is perfectly correct; but in view of past experiences, and in view of the loss that has been sustained even by men in this community and every other community throughout the Province, where men hold bank stocks, I say that we ought to see that there is incorporated into the new Act provisions for an independent examination of the statements that are published by the bank to the shareholders and the Government. What made it possible for the manager of the Ontario Bank to gamble with the bank's money in the City of New York? Because there is no independent audit at the head office. We want to steer clear of gambling general managers, and the speculative member of the board of directors, and we should require that there should be an independent audit at the bank's head office at the end of every six months and then we will have a watchdog at each office.

I thank you very much for this opportunity of addressing you, and I am pleased beyond what I can express at this particular opportunity, and I wish you a very happy and prosperous New Year. (Applause.)

The Chairman: On behalf of this Association I wish to thank the Mayor and Mr. Johnston for their very cordial welcome to the City of Belleville. It is not surprising to us that we received a hearty welcome at Belleville, because we have been here before.

DAIRY BACTERIOLOGY.

By W. T. Connell, M.D., Queen's University, Kingston.

I desire to submit to this annual meeting a report of the more important bacteriological work done during the past season in connection with our dairy instruction in Eastern Ontario.

Considerable attention has been devoted to pasteurization of whey, especially in its bacteriological aspects. Some 63 factories in Eastern Ontario have adopted this process and others have it in view. The main reasons urged for adoption of this procedure are, as I understand them:

1. Efficient pasteurization practically destroys the bacterial (germ) content of the whey. This has several effects: (*a*) prevents fermentation and decay of the whey during usual feeding period, *i.e.*, keeps whey sweet, rendering it more valuable as a food for animals; (*b*) prevents taint-producing bacteria being carried home in the patrons' cans, to be returned in next batch of milk, if cans have not been thoroughly cleaned; (*c*) destroys any disease-producing bacteria, *e.g.*, the tubercle bacillus which might possibly be in milk.

2. Pasteurization emulsifies the fat of the whey and incorporates it with the whey so that it no longer rises as a scum on the tank, where it is lost in so far as feeding value is concerned. Hence by incorporating the fat the food value is further increased.

I was particularly interested in the first part of the problem, especially to see if the methods of pasteurization adopted did actually destroy the bacterial content of the whey, and if not wherein the methods were inefficient.

Mr. Publow chose some four factories where the process of pasteurization was being carried out, considering that these would fairly represent the methods employed. Notice was not given to the makers, as it was deemed advisable simply to look into things as they actually were, not as they might be when fixed up for visitors. A travelling laboratory outfit was taken along and necessary specimens prepared and forwarded to central laboratory for detailed examination. In the *Farmers' Advocate* of Sept. 23rd, 1909, a fairly full account of the findings is reported, but the main points will now be stated.

TABLE I.—Temperature of Whey in Tanks Following Pasteurization.

Factory.	Highest Temperature Record.	Temperature 1 hour after Pasteurization.	Temperature 2 hours after Pasteurization.	Temperature 4 hours after Pasteurization.	Temp. of Whey going into patrons' cans following morning.	Minimum and Maximum air Temperature recorded.	Whey Tanks.
M—Factory, Leeds Co..	°F.	°F.	°F.	°F.	°F.		Wooden tank; mostly underground; covered by whey-house; some slimy deposit on sides; not recently cleaned.
First day	153	149	144	137	120	66–76	
Second day	155	151	147	140	122	62–68	
C—Factory, Leeds Co.	157	152	147	.....	100	66–78	Wooden tank; elevated; uncovered; cleaned partially on day of visit.
Hastings Co. Factory ..	160*	158	153	.....	116	62–75	Wooden tank; elevated; covered; some slimy deposit on sides; not recently cleaned.
Northumberland Co. Factory	160*	156	150	.....	96†	64–68	Wooden tank; half underground; well covered; some slimy deposit on sides; not recently cleaned.

*Whey albumen coagulated. †Due to running in cold water.

In pasteurization the temperature aimed at was 155 degrees to 158 degrees F. It is not advisable to heat higher, because when temperature goes to 160 degrees F. or over the whey albumen begins to coagulate and fall as a fine curd which accumulates on sides and bottom of tank. Further, no special advantage is gained by heating above 155 degrees F. in so far as destruction of bacterial life is concerned, while of course the higher the temperature is raised the more steam is required and the greater is the cost. It is possible that lower temperatures than 155 degrees F. when retained for considerable periods will be found quite efficacious. There is no doubt for example that under experimental conditions with average whey, a temperature of 145 degrees F. for 1½ to 2 hours is equal to 158 degrees F. for 20 minutes. If it is found that lower temperatures are as efficient, then of course the cost of heating will decrease. This is an aspect of the subject we mean to take up practically next season.

TABLE II.

NUMBERS OF BACTERIA PER EACH C.C.—PASTEURIZED AND NON-PASTEURIZED WHEY.

Factory.	Whey as drawn from vat (time of dipping).	Whey when heating completed	Whey 1 hour after heating completed.	Whey 2 hours after heating completed.	Whey as it went into patrons' cans.	Whey at dipping, drawn into sterile jar kept till following morning at air temp.	Remarks.
M—Factory, Leeds Co.							The moderately large numbers of bacteria present in whey as it went into patrons' cans (Col. 5), due to entrance of wash-water and whey drippings after temp. of tank has fallen.
First day ..	19,800,000	7,500	600	15,000	150,000	110,000,000	
Second day .	14,000,000	150,000	200,000	200,000	300,000	12,000,000	
C—Factory, Leeds Co.,	53,000,000	1,500	700	1,600	4,000	532,840,000	Fairly satisfactory.
Hastings Co. Factory ..	10,500,000	1,000	1,000	1,250	1,900	112,000,000	Best results of series.
Northumberland Co., Factory.	49,000,000	800	80	60	4,500,000	440,000,000	The large number of bacteria in whey when it went into farmers' cans, due to running in of cold water, cooling tank to point where bacteria could develop.
M—U—Factory, Leeds Co.	19,000,000	not	pasteur	ized	260,000,000	.....	Samples taken from tank of a factory adjoining one of above factories where pasteurization was not carried on.

Now of the four factories visited at two only was the temperature controlled by thermometer, the other two cheesemakers guessed at it. I must strongly emphasize the necessity for thermometer control to prevent underheating and to check overheating. At none of the factories examined did the pasteurization free the whey from all living bacteria (see Table II). But over 99 per cent. of the contained

bacteria were destroyed, and those that escaped destruction were certain Sarcinæ and some spore-bearing bacilli, also some spore forming yeasts and moulds. These spores would require a boiling temperature for quite half an hour to destroy them, while the sarcinæ examined were not certainly destroyed till the temperature reached 176 degrees F. for 15 minutes. But even if the pasteurization does not entirely free the whey from bacteria, so long as we can keep the bacteria left behind from developing, they will not be able to effect any change. Now this can be done by retaining the whey above the germinating or growing point of these bacteria which is under 108 degrees F.—in fact, is, as a rule, under 104 degrees F. Hence it is important in the pasteurization of whey to have a whey tank that will retain heat. The tank should be covered and whether underground or elevated is best insulated. When so constructed the whey ought to go into the patrons' cans at a temperature of 120 degrees F. in the warmer months of the year and over 108 degrees F. during May and October. At one factory (see Table I.) the whey stood at 122 degrees F. one morning, and at another at 116 degrees F., while in a third with an elevated uncovered tank the temperature was 100 degrees F., but in the last case the air temperature stood above 70 degrees F.

In none of the four factories were the whey tanks well cared for, and on the walls of these tanks above the whey line, where moistened and provided with food by whey splashes, myriads of bacteria were thriving and were occasionally washed into the tanks. Pasteurization ought not to replace cleanliness in any way, even though it renders the necessity for it less apparent than before.

TABLE III.—ACIDITY OF WHEY.

Factory.	Whey as drawn from vat at time of dipping.	Whey when heating completed.	Whey one hour after heating completed.	Whey two hours after heating completed.	Whey as it went into farmers' cans following morning.	Whey at time of dipping, kept in sterile jar over night.	Remarks.
M—Factory, Leeds Co.							
First day.....	.19	.19	.19	.20	25	.48	Increased acidity of morning's whey, due to drippings from curd.
Second day.....	.17	.19	195	.20	.28	.42	
C—Factory, Leeds Co..	.19	.27	.27	.27	.27	.55	Increased acidity after pasteurization, due to retained whey in tank.
Hastings County. Factory	.20	30	.30	.30	.34	.49	Increased acidity after pasteurization, due to retained whey in tank.
Northumberland Co. Factory	.17	.32	.32	.32	.35	.58	The whey left behind in tank (only a small amount) had an acidity of 1.42 on morning of my arrival.

At two of the four factories investigated the results of pasteurization were vitiated or spoiled by defects in the after care of the pasteurized whey. Thus at

one factory it was the custom to allow the whey draining from the curds and also the washings of the milk vats to run into the whey tanks, of course untreated. Now with these whey drainings and washings, great numbers of bacteria were carried in at a time when temperature would be too low to destroy them, but still high enough to prevent their development. At the second factory it was the custom to run about 80 to 100 gallons of water along the whey gutter into the whey tank at close of day's work. This water also carried many bacteria and its bulk cooled the whey very quickly. (See Table II.). In other words, at these two factories lack of knowledge on part of the makers was partially neutralizing the effects to be expected from the pasteurization.

As a means of control of the efficiency of the pasteurization, a test of the acidity of the whey affords a good index. The acid producing bacteria are the ones which are most readily and rapidly destroyed by the heating, and when pasteurization is properly carried out and whey tank is covered and sufficiently insulated the acidity will often not rise above .22 to .24 as tested by usual alkali test. An acidity rising over .30 means some failure in process, either insufficient heating or the entrance of material carrying acid forming bacteria at a time when temperature has fallen sufficiently low to permit of their retaining their vitality and developing when temperature falls to a point where germination is possible. Table III. will illustrate this very well.

One point which has been urged against pasteurization (but which to me does not seem to bear much weight) is that by destruction of the usual acid forming bacteria from whey, the more resistant bacteria and especially the spore bearers would have then an excellent chance to develop if cans in which whey was returned were not well cleaned when milk was placed in them. In examining the milk supplies of the factories I did find in all cases spore-bearing bacilli, but these did not seem to be more abundant than in ordinary dairy milk, *e.g.*, as one purchases from milk delivery waggons in city of Kingston. Further by the use of a proper starter the necessary acid forming (lactic) bacteria can be furnished. I will leave it to others to speak of the value or otherwise of pasteurization in checking bacterial taints and in increasing the feeding value of the whey. I feel justified in concluding, however:

1. Heating in bulk of whey to 155 to 158 degrees F. destroys over 99 per cent. of the bacteria, but under ordinary factory conditions never sterilizes the whey, as certain sarcinæ, spore-bearing bacilli and moulds can be grown from whey so treated. But these bacteria do not increase in the whey tank unless the temperature falls below the germinating point (108 degrees F. and under).

2. Heating to 155 degrees F. gives as good results as higher temperatures, and to avoid coagulation of the whey albumen, and thus destroying the uniformity of the whey, the temperature should not go above 158 degrees F.

3. The thermometer should be the means employed to test the temperature, not the length of time steam is turned on the tank, or other methods found in use in some factories.

4. In a properly-constructed, covered tank in our summer season, the whey will retain sufficient heat to go into the patron's cans following morning at 115 to 122 degrees F.

5. The acidity of whey when going into patrons' cans affords a good indication of the efficacy of the pasteurization, and ought never to rise over .30 lactic acid.

6. No washings, water or other matter should be added to whey tank after heating is completed (unless such are first pasteurized).

Farm and Factory Water Supplies.

Another subject to which considerable attention has again been given is that of water supplies at factories and at farms. During past year over two-thirds of such samples submitted have proven to be infected with dangerous forms of bacteria. I class as dangerous those forms which can be traced as originating from the intestinal discharges of animals or man, or in the case of factories as coming from factory drainage or whey. Of course it must be remembered that I am only sent samples which have fallen under suspicion, so that my figures do not represent the condition of the farm and factory wells in Eastern Ontario. Still I think I can state that quite one-third of the wells at farms and factories are so situated as to be open to pollution from surface drainage or from seepage from manure piles, stables or pig-pens, or from house wastes. I find it a difficult matter at times to convince factory owners, etc., of the correctness of the reports, and have often had flung at me when my report has condemned a farm house supply that the water has been used for twenty or thirty years without falling under suspicion, hence my analysis must be wrong. Even the sight and smell of polluting material fails to convince some. I can best illustrate this by telling what I myself saw this past season at a factory shortly after it had been rebuilt on site of previous one. The factory was quite well situated on a sandy ridge, and very little care would provide good drainage, and with that a good water supply could be assured. The floor of the make room was of cement, and there was a gutter which served as whey drain, and as drain for washings (a very common and very bad system from a sanitary standpoint). This gutter connected through the wall with an elevated, open trough, with very frail supports which ran to whey tank some 30 feet away. There was no outside drain, and the connection between the gutter and open trough permitted considerable splashing. Now the well was within 12 feet of this connection, and inside the engine room, with mouth covered by open grating through which ashes, chips, etc., readily made their way; further the soil about the well was a loose sand. One day the whey trough fell down but the whey was run out just the same, and of course the well became the whey tank that day. But this fact did not stop its use, nor did a similar accident a few days later. The cheese began to be complained of, then were cut in price, and next the assistance of the instructor was wanted to assist in determining what was the matter. By this time the water was very foul, but it did not enter into the cheesemaker's or owner's head that this could be the trouble—it only had whey in it, you know. A visit by Mr. Publow and a plain talk of what had to be done at once convinced them, but it cost them $400 in cuts in price of cheese.

My point is that if it was difficult to convince people when there was visible indications of pollution in the water, and when the nose made one aware of it when one entered the factory, how much harder it is to convince men, when such tangible evidences are lacking. It seems to me to be an essential that factories and farm well waters should be safe to use—should, in other words, be free from pollution by excreta of man and animals; there should be more care of factories from the drainage material, more care taken in the location of wells, in the protection of their mouths, and in seeing that drainage matter and excreta are not permitted to foul the soil in the drainage area of the well surface.

Mr. Ruddick: You spoke of the whey in the tank retaining temperature at a sufficiently high point to prevent further growth. Supposing you were using steel tanks and the weather was very cold, would you not think it would be advisable to insulate the tank by a covering of wood?

Dr. Connell: Decidedly. Of course when a tank is under ground it requires no insulation, but when it is elevated it certainly does. In one tank this summer, which was uncovered, the temperature the following morning was 100 degrees. In the case of the other tanks which were covered and more or less insulated, the temperature never fell below 120 degrees.

CREAMERY WORK IN EASTERN ONTARIO, WITH SUGGESTIONS FOR IMPROVEMENTS.

By F. Singleton, Dairy School, Kingston.

The creameries which I have visited during the past season are situated largely in the counties of Ontario and Victoria.

The make for 1909 is about the same as that of the previous season, some creameries showing a slight increase in make, while others show a slight falling off. The average selling price of butter for the season was slightly lower than that of 1908.

My work and time during the past season has been entirely under the direction of the Chief Dairy Instructor, Mr. Publow, and I visited the creameries at such times as instructed to do so by him. In all I spent about sixty days on creamery work, travelling, calling on creameries and creamery patrons.

The butter, as a rule, has, in my judgment, been fairly well made during the past season. In a few creameries there was some slight unevenness of color in the first few days' make, but otherwise the work, as far as was within control of the maker was usually well done. The flavor of the butter is not all that is desired, but in only one creamery, as far as I know, has there been any serious trouble in this respect. About fifty-five samples of butter were tested for moisture content and showed an average of 13.63 per cent. The moisture content usually ranges between 12.5 and 15.5 per cent. In three of the samples tested the moisture content exceeded the legal limit of 16 per cent.

In considering this subject, "Creamery Work in Eastern Ontario, with Suggestions for Improvements," it will perhaps be best to consider it from three different standpoints; first, the buttermaker; second the creamery, and third, the creamery patron, and consider the weaknesses and requirements of each.

The makers are, as a rule, quite competent men, men who in many cases own the creamery they are managing, and have had a long experience in the business. Of the sixteen I visited, seven were dairy school graduates, four had attended a dairy school but had not graduated, and five had not attended any dairy school. The two or three men of the sixteen whom I consider poor men are included in the last five, and these men should take some steps to make themselves more proficient in their work.

The *creameries* are generally clean and sanitary with good water and good drainage. Two of the creameries installed septic tanks during the past season, both of which are giving excellent satisfaction. Of the sixteen creameries I visited thirteen are equipped with concrete floors. The refrigerators are the weakest part of the creamery equipment, and in many cases should be improved, as not over five of the sixteen creameries I visited have suitable refrigerators. As nearly all our creameries are now operated on the cream gathering plan, the haulers' outfit may be considered as a part of the creamery equipment.

Two of the creameries use individual cans, one only is using the tanks, and thirteen are using the jacketed cans, which are, except at one creamery, in very good condition. The individual can has much to commend it, as the creamery manager has an opportunity to examine each patron's cream and usually a better raw material is secured when delivered in individual cans.

One creamery provides tarpaulin covers to protect the gathering cans from sun, rain and dust, and this is something with which every cream waggon should be provided.

Practically all of the cream is collected only twice a week. It would be better were it colllected three times each week, yet it appears that the business must expand in the average creamery before it will be profitable to gather oftener than twice a week. Cream can be delivered sweet and in good condition and only gathered twice a week if a fairly heavy cream is separated and properly cooled.

Coming to the patrons' side of the question we find more serious difficulties. Many patrons are either dissatisfied with the business, or indifferent to it. The dissatisfaction is largely over the testing of the cream and this is a problem which creamerymen must consider before long. In fact the trouble has become quite acute in some sections, and one prominent creameryman has said that this is the most difficult problem with which creamerymen have to deal.

In the first place there is no uniformity among the different creameries in methods of testing. Some use the 17.6 c.c. pipette and do not rinse it after taking the sample; others rinse it after taking the sample and add the rinse water to the test bottle; others use the 18 c.c. pipette either rinsed or not. None are using the scales to weigh the sample. The difference between using a 17.6 c.c. pipette not rinsed and an 18 c.c. pipette rinsed, with the rinse water added to the test bottle, will make a marked difference in the reading of the same sample of cream. This lack of uniformity and this inaccuracy in testing has two evils. First, a correct comparison cannot be made between the price per pound of fat paid at different creameries, and secondly, any method of testing by means of a pipette will not do justice to the different patrons.

The creamery using the 17.6 c.c. pipette and not rinsing it does not credit the patrons with all the fat they deliver, consequently a higher over-run is obtained, and an abnormally and fictitiously high average price per pound of fat is paid. The neighboring creamery may be using an 18 c.c. pipette and rinsing it after taking the sample. The over-run is not so high, neither is the price per pound of fat, but the patrons get as much money, other things being equal, in that they are credited with more pounds of fat. This causes dissatisfaction among patrons of both creameries, in the first creamery over the lowness of the test, and in the second creamery over the lowness of the price.

The Babcock test is based on weights, and it is simply for convenience that we use a pipette in testing milk. Milk is fairly constant in weight, so we can use the pipette in testing milk and get accurate results. But with cream we have an entirely different proposition, for it may vary in fat content from 11 to 50 per cent., or even higher. As fat is the lightest constituent of cream, the more fat cream contains the less will a given volume of cream weigh. This explains the inaccuracy of any pipette in testing cream. An 18 c.c. pipette rinsed and the rinse water added to the test bottle, will with a 27 per cent. cream deliver the correct weight into the test bottle. As the percentage of fat increases the sample becomes lighter, and the test is too low, while as the percentage of fat decreases, the sample becomes too heavy, giving too high a test. This simply means that where a pipette is used in doing the testing, the man sending rich cream does not get paid for all the fat he sends,

while the man sending cream containing less fat than 27 per cent. will get paid for more fat than he sends, and the greater the extremes the greater will the error be. The patron is advised by creamery men and instructors to get the test up somewhere between 30 and 35 per cent., and this has many advantages, yet the testing is done in such a way as to put a premium on low testing cream. The remedy for this is to use the scales and weigh each sample into the test bottle and each patron will get paid for what he sends. The use of the scales in cream testing will do away with much of the friction with and dissatisfaction among creamery patrons.

The sampling is usually quite accurately done by the hauler, but the samples do not in some cases receive the attention they should at the creamery. The samples should be warmed up occasionally and the preservative mixed with the fresh cream. They should be kept well corked, as, if left uncorked, moisture evaporates, leaving the test too high. This has no doubt been responsible for some low over-runs.

Another great reason for the indifference of many patrons to creamery work is that with the average patron the business has not been profitable. According to Mr. Publow's report, the average production per cow for the six months, May 1st to November 1st, was about ninety pounds of butter. The average selling price of butter was 23½ cts. Deducting four cents for hauling and making this nets the patrons 19½ cts. per pound of butter, or $17.55 per cow for six months. This is not profitable and is no doubt responsible for many a patron's indifference to the creamery.

The quality of the cream as delivered to the haulers is not all that could be desired. First class cream to my mind is cream that is clean in flavor, testing 30-35 per cent. fat and sweet. Much of the cream is not clean in flavor, is too low in fat and it is practically all sour. This conclusion is the result of visits to some 250 farms with the cream haulers and examining the cream as delivered to them. As a result of the cream being in this condition there is no ripening done by the creameryman. Butter-making in the average cream gathering creamery consists of cooling and churning the cream as soon as possible. The butter from such cream will with proper handling have good body and texture, but the flavor may usually be described as "not clean," "high acid" or "old cream." I have in my visits to the farms tried to point out to the creamery patron the necessity of having the cream in better condition and there have been good results from this work. This work of visiting the farms is important, and has been appreciated by the creamery men and appreciated most by the best men. More of it should be done, yet it is difficult to see how an instructor with the time at his disposal can visit a high percentage of all creamery patrons, and it seems that creamery men should do more of this work.

Assuming that the farms I visited represent average conditions, and I believe they do, 50 per cent. of the separators are in unsuitable locations, 75 per cent. are washed only once daily, while only 1 per cent. of the patrons make any attempt at cooling cream, other than placing it in a cellar.

The separator should be in a clean location, where the atmosphere is pure and should be washed after each time it is used, as it will not only give the cream in a more cleanly condition but will do more efficient separating. The practice of washing the separator only once daily is a filthy one which should be discontinued.

The average percentage of fat in the creameries I visited east of Lake Simcoe is 27 per cent.; west of Lake Simcoe it is 19 per cent., while for all it is 26.1 per

cent. Taking a fairly rich cream, say 30 to 35 per cent., has many advantages over thinner cream:—

1. Usually the cream is delivered sweeter and of better flavor.
2. More skim milk is left on the farm for feeding purposes.
3. There is less cream to handle, cool, and haul.
4. Usually a slightly higher over-run is obtained on account of more moisture remaining in the butter from the heavier cream.

To illustrate this last point the average fat in the cream for all creameries was given as 26.1 per cent., and the average moisture content as 13.63 per cent. The average percentage of fat in the cream received at the creameries west of Lake Simcoe was 19 per cent. The moisture content of the butter in these creameries averaged 11.96 per cent. The average percentage of fat in the cream received at the creameries east of Lake Simcoe was 27 per cent., while the moisture content averaged 13.95 per cent.

Lastly the cooling. If the cream is to be delivered sweet it must be cooled as soon as separated to a temperature in the neighborhood of 50 degrees. It may then and not till then be mixed with older cream. Every creamery patron should put up a supply of ice and use it for cooling cream. Many creamery patrons now store ice for household purposes but do not use it for cooling cream as the creamery has not demanded an improved raw material. If the cream were all delivered sweet, the improvement in the quality of the butter would demand a premium in price that would well repay the patron for his extra time and labour.

The Chairman: We are glad to have a representative of the Montreal exporters with us. He is well known to every dairyman and every cheeseman in Eastern Ontario. There used to be a time when we thought the cheese buyers wore horns and hoofs, and we thought they were very bad men, and that they monopolized all the money in the business, and were a kind of necessary evil; but I think that idea is now pretty well blotted out, and we have got to understand that the cheese buyer of Montreal is a friend to the dairyman, and that he handles our product to the very best advantage. There is a class of people in Ontario who think we ought to do away with the middle man, and that we ought to take our cheese to the other side and sell them there; but if we do that we have to sell them through middlemen there. My idea is to encourage just as many of these merchants in Montreal and other places who are handling our exports, so as to have sufficient opposition, and I believe in the end we will get more money for our products than by any other means. I am very glad indeed to have this representative man here to speak to us to-day. He will probably give us some information as to how our products are handled, and what prospects there are for the trade for another year, and what the buyers have done with the products for the past year. I am sure we will be very glad to listen to Mr. Hodgson.

A CHEESE MERCHANT'S ADVICE.

By H. H. Hodgson, Montreal, Que.

I am here almost by accident. I did not know that I would be asked to come here, as my brother was going to be present; but he found it impossible to get here, and I was very glad to come back to Belleville. It is like coming home, because I lived here six or eight years, and I know you will give me all the indulgence I might

ask. I listened with a great deal of pleasure to Mr. James' address last evening, and I noticed that he said there were one hundred millionaires in Montreal and ten millionaires made this year. I asked him if he found any cheese or butter men among the lot and he said he did not. And I can assure you, you will never find cheese or butter millionaires. We are philanthropists in Montreal. We believe in the doctrine that man cannot live to himself, and that he must go to work and give out to others. We have got to realize first of all that we are the people in this Dominion of Canada, and we take the lead as far as money is concerned in the results of this business of the cow.

I have a pamphlet before me on the interest of commerce in promoting International Peace. I will read the first part: "It requires no argument to demonstrate the influence of satisfactory commerce relations in maintaining a secure and enduring peace between nations. It is one of those things which logic teaches and history confirms. The basic principle of this great silent influence is mutually of interest. The same restraining forces are at work to build up friendly relations between two countries engaged in commerce with each other as operate to prevent a quarrel between business men and their customers or a lawyer and his client." Now this mutuality of interest is what tells. One man may have a little more money than another, but after all we are all on the same level.

We have at the head of our Dominion Dairy Department, Commissioner Ruddick, a man who does not need any eulogy from myself, actions speak louder than words. We have also Mr. Publow and the instructors under him. We merchants in Montreal are concerned in this matter. I want to say for Montreal, that it is the best thing the Easern Ontario Association ever did to have these instructors and to have such a grand man over them. (Applause.)

We find this year that you are going to register the factories, and this is a step in the right direction. Next year you will probably license cheesemakers, and that will be another step in the right direction. We are not standing still; we are going forward and not backward. You have made marked progress in the manufacture of cheese right from Prince Edward Island to Sarnia.

I do not want you to be puffed up, and put your knees back, and stick up your feet and smoke your pipe, and think it is all right. Eternal vigilance is required if you want to attain to the height which you are aiming at—if you want to manufacture goods that will sell themselves, and do not require a man behind the gun to sell them for you. I wish I could transport every cheese maker and every president of a factory to Montreal and have you in our office for two or three months and then you would see the immense amount of work you give us to do. We have to employ men first of all to do nothing else but to stencil the weights on the boxes. I am glad to say that fully one half of the factories coming down to Montreal have sent them with the weight stencilled, and that is an improvement. We are not here to grumble, but there are some sections that have made more rapid advances last year than the year before. One section especially has adopted this plan, and they have splendid boxes, and they are cut from three strips instead of four, and are made thicker, and they are all uniform and have one standard brand for the section. They put the factory on first and then the number 1, 2, 3, 4, and they give the number of the cheese board. And this year I have no doubt they will put a registered brand on each, and then if they put Canada in with a nice rubber stamp in red ink and then stencil the weight on the box, and they are very carefully weighed, when these go over to England there is no trouble. This has been adopted in four sections, Madoc, Campbellford, Sterling, and Belle-

ville. I think Brockville might change their design. I like a smooth clean surface on top of a box.

Cheese are sold in England by sample. They are first of all taken into the sample room, and of course the nicest boxes offered there get the highest price. Sometimes they say it is hard to get a good sample because boxes arrive there in such a broken condition. If the boxes are all right and nicely branded, it has the same effect as a man with a clean face. If he has a dirty face you don't want to have much to do with him.

When an Englishman sees anything he wants he takes it. He is not like men in this country, who want to see everything, and then make their pick. We have been looking after the boxes better this year than before. We have done away with the sling, and they now use big boxes for the cheese, and they are trucked in, and then the large boxes are lifted up and put in the hold, and each man takes one by itself and carries it by itself and they come over in better condition.

Two years ago a gentleman came over to my warehouse from England, and at the time he arrived we were loading our waggons with cheese. He said, "Do you handle your cheese like that?" and I said, "That is the way they leave; the boxes are in perfect condition." He said, "I would give one shilling a hundredweight more, if you could land them in that way."

I offered to supply these stencils to the factories, but we have been turned down. The poor cheesemaker says he has not got time to stencil the weight on the boxes, and if he cannot do it nobody else can.

In a factory in Western Ontario they had a committee of directors who sometimes went down to the station, and if they saw a box come down that was broken it was sent back to the factory to get a new box. And I think you ought to do that. If you have directors on your factory, you should make them work.

I am glad to announce that we have only had one case of filled cheese, and I am glad to say that that business is about done, and I hope it will be done away with altogether. This was colored cheese, with white cheese put in the centre in the hope that we would not find it. But we just happened to send our tryer up to the hilt, and we got a little bit of white cheese and we got it cut in two at once. Three years ago in England I was bitten by a lot of 15 boxes of cheese, and I had to make 3 shillings allowance, and I could not get that back from the factory because six months had gone by before it was discovered. I want you to try and help us, and we will help you. You cannot make your cheese or butter too fine, for the finer you make it the better people like it and the higher prices you get. The trouble is we have had too many second and fourth grade cheese in the past.

You know that you take the best you can buy and it is the same with the Englishman. I would like to feel that we are getting into higher realms of business, and I believe that commerce is going to make peace in the world. What is Germany building these big ironclads for? Simply to secure peace and protect commerce. The idea of war makes you shudder. We do not want to have any warfare with England on the quality of our produce, and we do not want to have any cross words. We want to keep our interests together, and we want to give them what they want and produce what they want. I know that you have been anxious about the milk supply, and if you will only take in all that has been said and done then I think we will have a future that will be a brilliant one, and we will have no more trouble about the quality of our goods. "Righteousness exalteth a nation, but sin is a reproof to any people." I use that expression in all solemnity and seriousness—the right way of doing things. "Uprightness in all things exalteth this dairy industry, but the sin of milking poor cows will do a lot of harm."

A dairy exporter said to me, "I would like to be in the place of the farmer because they are better off than I am." When milk is up and prices are good, he says, "Cow bossy," and strokes the cow's neck, and does all kinds of nice things for the cow; and then the cow gets in a nice gentle frame of mind and gives lots of milk in the pail. But when the milk is low, and things do not go right, the hired man kicks poor "Cow bossy," and uses strong language, and the consequence is that the cow holds the milk up and it does not go down into the pail, and we do not get the yield we should get, and when the markets are low we do not make the money we ought to make.

It is said that a lady in Wisconsin when her milkers go out to milk her cows takes a guitar with her and plays to the cows. She has a herd of Jerseys and she sings to them. Sometimes she sings a gay song, other times, "Where are you going, my pretty maid ? I am going a-milking, sir, she said." (Laughter.) She pets the cows and makes great friends of them and she calculates that she gets, as a result of singing to the cows when they are being milked about 3,000 pounds more a year from each cow. She has them so tame that they really like her. What we want is better milk, and that is how the English beat ours in flavor, and that is the only way in which they do beat us. I do not think they beat us when it comes down to the actual quality of cheese. We have more fat in our cheese than they have, and I will give you an example. My brother lives in England. He put before me a piece of Cheddar cheese, and I said to him, "That is not good; I will get you a piece of real prime Canadian Cheddar." He said, "You cannot beat that English cheese." But I went to Lipton's and got a piece of Canadian cheese that came not far from Belleville. I got a nice fat solid piece, there was not a crack in it, and I took it in and he had to own up that it was the best; and ever since then he has always used Canadian cheese, and I always ask for it wherever I go. (Applause.)

Senator Derbyshire: How delighted we are to have these merchant princes with us. They handle this vast product during the year, and I am sure we have all been pleased with the interesting address we have had from Mr. Hodgson. We would have liked to have had a great many more of the exporters from Montreal visit our Association so that we could get acquainted with them, and see the men that are handling our product from year to year. All Mr. Hodgson has said about the boxes is important. It is an easy matter to have them a little heavier and have better boxes. I would like you to think over the address we have had from the young man from the Kingston Dairy School. I would like you to think over the style of that young man, and I want you to understand that he was educated in our own Kingston Dairy School, and that the young men who go to the Kingston Dairy School for education come right in contact with this young man and Mr. Publow, and these other men who are so eminently qualified to fit them for better positions and to raise the standard quality of the goods throughout Ontario. Every cheese-maker in Ontario should go down to Kingston Dairy School and get a training from these men. (Applause.)

Mr. M. K. Everts: For the past two years I do not think there is another nation that has made the progress that Canada has, and the eyes of the world are upon Canada to-day, and it is up to the farmers of this country to see to it that the opportunities that we have should be taken advantage of. You all heard what our cousin from the south said last night—that it will be only a very short time before the people of Canada will be feeding them as well as the people of Great Britain. They want our cheese and butter. The duty upon the necessaries of life which they have to pay will not be tolerated much longer. Their census will show a population of 90,000,000, and 60 per cent. of their people are living in villages

and towns and cities, and there are few working the land. The leader of the Opposition in the House of Representatives for Missouri told them last week that the Argentine Republic out-stripped them in the exportation of wheat and corn, and said that in five years the United States would have nothing to export, and they would be coming to Canada to buy their butter and cheese and poultry and eggs and products of that sort necessary to live, and what the people have got to have. If Mr. Taft's election were to come on to-morrow he would go down like a June frost before the hot sun. The laboring class are rising in their might, and they are looking to Canada to feed them. You know that they have been stripping the frontier of this country, from Quebec to Sarnia, of our cream; and if they put on a duty of only three cents a pound on cheese they could come over here and buy it.

Before five years roll around, Canada will have three of the largest markets in the world—that of Great Britain, the United States and our own North-west.

I am delighted with addresses I have heard to-day, and I was delighted with the remarks of my esteemed friend, Mr. Singleton. I think we should be given a chance to ask questions from such men as Messrs. Ruddick, Barr and Publow. I was delighted with Mr. Publow's report. We have grand men filling positions in Eastern Ontario. No country in the world has a finer class of men than we have right here. Take a Canadian boy and let him drop anywhere, and he will light on his feet like a cat. They are seeking such men the world over, and our Canadian boys make a name for themselves wherever they go. Canadian is the only qualification that is asked, and if you come from Canada that settles it. (Applause.)

SOME THINGS WE NEED.

Dr. C. A. Publow, Cornell University, Ithaca, N.Y.

If you had noticed my expression since our good friend, Mr. Murphy, invited me to come over here, it would not be at all necessary for me to mention the great pleasure it gives me to meet with you again after an absence of a little over two years in the country to the south of us.

It has always seemed to me that dairymen in Ontario take the greatest amount of pleasure out of these annual conventions, and the only explanation that suggests itself to me is the fact that the dairymen in all branches of the work are able to bring out the problems they have encountered during the year, have them discussed, and have remedies suggested. Then you are satisfied, and when persons are satisfied they are happy and when happy they show it. So I suppose this is the reason why the dairymen of Ontario are such a happy-looking crowd.

I wish I could say the same thing about the dairymen of the State of New York. I wish I could bring them all over here, just to have a look at you, to see how you do things, and to see what a dairymen's convention really ought to be. I have great ideas of the amount of good they would receive from your example.

This winter at our convention held at Watertown we had the honour of addresses from your Dairy Commissioner, and from your Chief Dairy Instructor; and while I know these gentlemen were somewhat disappointed in the attendance, I want to say that this is one reason why the Canadian experts were invited; to come over and give new ideas and create new enthusiasm. You cannot get along without a little Canadian blood even on the American side. The dairymen of New York

State have not had the best methods of dairy instruction, and we have a very large amount of slowness on the part of cheesemakers and buttermakers especially, to accept instruction of any kind. But this prejudice we are gradually overcoming, and from your example and our own efforts we hope some day to have conditions as they ought to be.

Dairying, however, is not by any means a failure in the State of New York, and there are a few successful phases of which Canadians might well take note. If you will allow me, I would like to start with the first factor in dairying, and going along the line make briefly some comparisons of the things we need.

We have all been very much interested in the experiments of Mr. Barr in connection with the preservation of milk, and it seems to me that this question of clean milk is the one which must decide the future of the dairy industry. The farmers of Ontario, as a rule, are doing much toward this end, but in the methods of caring for milk I must say that the farmers of New York State are much ahead. In this State you seldom see an open milk stand located close to a barnyard, hog-pen, whey barrel or roadside. They are giving as much or more attention to cleanliness as they are to cooling. In other words, we believe in keeping the dirt out of milk altogether; then we do not have to worry about cold or other methods of preservation, because if the dirt once gets in, no method of cooling will ever restore the pureness that has been lost. With this end in view, we find our stables being rapidly cleaned up and whitewashed. The cows and milkers are clean, and not by any means the least is the use of the small top milking pail. Practically every dairyman has his little milk-house, where milk only is kept, and practically every farmer has a supply of ice or cold water to be used in connection with the Star milk-cooler, which is now invariably used. This is really the strongest feature of dairy work in New York, while in Ontario, I believe, it is the weakest. Apparenty New York farmers have been quicker to realize the unequalled value of care and cleanliness in the handling of the raw material in this respect. Now, why should Ontario, with the best factories, the best makers and the best system of dairy instruction in the world, be behind in this great, yet simple detail? How long will our Ontario patrons continue to place the cans of fresh milk upon an open stand close to the roadside, where the polluted dust may enter in clouds, or in close proximity to the barn-yard, stable, hog-pen or whey barrel; all of which give to milk its meanest odors? Why not have a neat covered milk-house with convenient cooling facilities, and why not have a clean whitewashed, well lighted and well ventilated stable, and use a milk pail that will keep out at least three-quarters of the contamination? Does not the business deserve it? You and I are not in this business for a day, or a year, but for life, and it will go on after we are gone. Then why shouldn't we get fitted up to make the best of our greatest industry and the greatest source of maintenance and profit?

We sometimes ask ourselves what are we getting in return for all these improvements we are making. Do all these modern practices bring us increased profits? And we sometimes feel they do not. But let us look at it the other way. How much would we lose if we did not do these things? What would be the result if we left undone the little things that cause us extra time and labor? Then let us go back to the time when we had no dairy instructors, no dairy conventions, when bacteria and methods for their control were unknown. Ask any of our older and more experienced men, men who have produced milk for 50 cents a hundred pounds, men who have worked for long seasons with little compensation, using the early methods that meant brain worry both day and night; ask these men who have kept abreast with the many changes, men to whom we younger

men owe much, and from whom we have still much to learn; ask these men what has been the value of our new fangled ideas. Experience and common sense is all we need to give us the realization of what has been our good fortune.

Think of the advances that all branches of science and industry have made. Let us remember that the nations of the world are in competition, and that in the great struggle for existence and success it is only the strongest who can survive. Many nations now follow dairying. The new countries have the advantages of the successful methods of the old; and they have the increased ambition to succeed and advance. Our old school fable of the hare and the tortoise is still too true. It is the one who keeps moving on that wins the race. Fellow-dairymen, let us not forget that we are in a great race for supremacy in the dairy markets of the world. Many are the competitors that will take advantage of us if we lag or stop to rest. Then with our present advantages, of which we should all feel proud, let us enter into the work of a new year determined to make our country envied, honored, respected and loved for the cleanliness, the honesty and the purity of the products of the deserving old cow. So much for the farmer.

Permit me to say a few words which may apply more directly to the men who make the cheese. I want to say first that you are internationally recognized as the best cheesemakers in the world, and I feel proud to be classed with you in anything of so high a rating. But let me say also that the making of cheese in itself is not the only accomplishment for us to observe both in the future and right now. What reputation we may have, we have won by doing things, and if we are to hold our good name, then we must keep on doing things. A baseball championship is won or lost in a single game, and one may be responsible for either; a horse may lose a championship in less than two minutes; the Americans lost the European export trade on cheese in a single season. It is hard to keep on top, and we cannot do it by standing still. New Zealand and others are after our markets, and we as factory managers must do more than manufacture cheese.

At present you have in Eastern Ontario about thirty dairy instructors. In the State of New York we have but six cheese instructors, but we have over 1,400 persons whose duty it is to instruct the farmers in the production of clean milk. Now to my mind there is no reason why every factory manager should not be a dairy instructor. He knows, or should know best, the needs of his own patrons; he meets them or can reach them any or every day, and if he is the right kind of chap they will do as he asks. Think what it would mean to have 1,000 such instructors instead of 30, right here in Eastern Ontario. The regular instructors are all right, but they only get around about once a month. It seems to me, then, that if the makers would do their part it would only be necessary to have the instructors attend to difficult or obstinate cases which the makers might not be able to handle, and results would be much more noticeable. We say we are kept so busy in factory work we cannot find time to look after the patrons. But we can. I have been long enough in factory work to know we can. The trouble with most of us is we do not know how and do not try to find out. I tell you, men, we don't do enough. We do not think enough. We are more like transfer companies carrying other men's ideas. Why do not we have more originality and more enthusiasm in our work. This country gives us strong bodies and brains. We use the body too much and the brain not enough. We talk about cheesemakers' unions and raising the wage scale, but let me say right here, that the best union we can have is a union with the patrons of our own factories. This is the union that will determine a man's worth and his salary; the union that brings greater profits to the farmer and the one

co-operative necessity in successful factory management. We ought to be more diplomatic. Do not tell me you cannot visit the patrons.

We criticize the farmer, but the farmers are the finest people in the land. They are most generous in their own way, and willing to do the best they know how. They are conservative and content to let well enough alone till something else proves better, and we cannot blame them. It is up to us to show them the things that are better. The milk business is theirs, the product is theirs, and they should control their business. Did you ever stop to consider this peculiar and unique state of affairs? Farmers hire a man to work for them, but unconsciously the farmers work for the factory manager instead. They take his orders and his abuses, and in the great majority of cases do as he bids them. Now surely this should not be the case. It is so in no other business that I can think of. The farmers should know better their own part in the work, and then be able to control the men they employ. Then and only then will our factory managers be compelled to perfect themselves in their chosen professions in order to hold the select positions and demand the larger salaries.

Let us have a little more individualism and personality in our work. Many indeed are the successes we can earn if we accept and make use of the advantages that are ours. We should improve our personal appearance when at work, we should take advantage of the weather conditions and markets in the making of the most cheese that good quality will permit. We should put our product up in better styles to entice the buyer and increase consumption. We should have greater co-operation with our dairy instructors, and we should improve the appearance and surroundings of our factory buildings. Make these places that are too often recognized by their smell, models of neatness and purity. These things require but little time and labor, but they will do much to improve the man and the business and to elevate profession in the eyes of the public.

In closing I would say to the farmers especially, that you should share your prosperity with your factory manager. If fortune has favored you with high prices for your milk and cheese, pay your cheesemaker accordingly, and do not offer the factory to another man the following year simply because he is willing to work for less money. That type of man can bring you no good. In the first place he is degenerating himself and his business, and he will degenerate you if you take him in. Old fashioned facilities will not do for the modern business. We do not want the old time cow, but let us have the best. Then give her the food that she always needs; give her the home that she surely requires; give her the air that her health demands, and give her product the care that its purity deserves, and you will have accomplished all that can be asked of a good Canadian dairyman.

And to the makers I would say that you are doing much but can do much more. I am sure you will all agree with me when I say that we have not been of the greatest usefulness unless we have left the business in better condition than when we took hold of it,—unless the people have been helped, and the country has been better both morally, mentally and financially because we have been in it.

Q. Do you make whey butter on the other side?

A. Yes, our losses are greater there than they should be. We are not making as much there as you are here.

CO-OPERATION IN AGRICULTURAL EDUCATION.

By G. C. Creelman, President O.A.C., Guelph.

I bring you greetings to-night, as it has been my privilege for some years, from the Ontario Agricultural College and Experimental Farm. I am pleased to say to you it is full at this time to overflowing. We have one hundred more students in Agriculture than we can accommodate in our College Residence. We have fifty young ladies on the waiting list who cannot be accommodated at Macdonald Hall, and on Monday next we expect, from the applications that have been received, to welcome five hundred matured farmers at the college for the course of two weeks in Stock Judging and Seed Judging, and Poultry Husbandry for four weeks, and the course in dairying of three months.

Last year through these courses we had 1,275 students, so that you see it is no small problem that we have to work out for you at your College in the city of Guelph. —the agricultural education of the farmer and the farmer's son and daughter.

I am going to say some things to-night along the line of co-operation in agricultural educational affairs. There has been co-operation for all time in this world more or less, I suppose. There was co-operation even in the garden of Eden when Adam and Eve decided to build up the human family. There has been co-operation in dairying in this country when the two R's, Robinson and Ruddick, accepted the Dairying Commissionership, and the two P's, Putnam and Publow, in carrying on dairy educational work, and the two D's, Dargavel and Derbyshire, in managing the affairs of this institution. (Applause.)

There are three or four elements that enter into this matter of co-operation that I am going to discuss with you to-night. Farming is the greatest business in the world, but the farmers themselves do not always believe it. They come to me in large numbers during the month of June to the extent of thirty or forty thousand. Every day we have a large excursion from as far east as Belleville and as far west as Windsor and from the north and south. They come to look over our Experimental Farm and get inspiration for their work, and they say to me, "Our business is not in it with the professions." And I will say, "Why?" Some of them will say, "I have a son-in-law or a son who is in medicine or teaching school and who is making more money than I am," and I often have to straighten up a man like that.

The farmer who is well to do and who gets three square meals a day and a month or six weeks holiday each year; farmers who are paying their honest debts, and if they have in their possession a piece of real estate valued anywhere from $5,000 to $20,000 when they are forty or fifty years of age,—I do not think it is for that man to decry his calling. (Applause.) Nor ought he envy the man in the city a single thing, unless it be a few things he could also have on the farm if he desired.

I want to say to you in all kindness that the man in the city or town who is paying out his entire income in order to live is not doing nearly as well as the farmer who is able to save a little each year. And while there are thousands of farmers who will give up their farms at the present time for a job worth $600 or $700 a year; and it will take all of that to barely keep him. The farmer does not consider the cash he has left over on the farm at the end of each year is clear profit, and he has had his living off the farm as well, while the man in the city has to spend his entire income in order to live, and has nothing left at the end of the year. There are not many men who get even a thousand or twelve hundred a year. In cities like Ottawa and Montreal and Toronto, there are thousands of men who are living

on less or existing on less, who would be a great deal better off if they were living on a farm, and their boys and girls would be a thousand times better off if they were back in the country where they could make just as good a living as it is possible to make. (Applause.)

I think the reason why more of us are not making greater progress on our farms, and are not more contented with our positions, is a lack of breadth in education and a lack of breadth of intellect. We live monotonously on our farms. We do not know very many people outside our friends and neighbors. Very often we do not know the people on the next concession unless some of our friends are married to somebody over there. In the cities men make a larger acquaintance, and as they rub up against each other and see many men that are not as well off as themselves, they appreciate their position all the more.

I am going to say one or two things that will help to brighten our view and give us more money to allow us to travel and see some of the things that we do not have an opportunity of seeing. We spend too much time on our farms doing things in the old way when there are new methods and new conditions which we have not yet put into adoption. I will illustrate that: The average crop in the province of Ontario is not more than from one-third to one-half the possible return. Some farmers are getting forty bushels of wheat to the acre, but the average crop is only twenty-two. It is the same in oats, peas, barley, rye, roots, milk or anything you will. We find that the average man is not getting more than one-half what he might if he followed methods that are already known. I could not have said this to you a few years ago. It would have been cheeky for me to have come then and told you this, but we have at the Agricultural College and at the Experimental Farm at Ottawa conducted careful experiments as to the best varieties for particular sections of the country, the best kind of dairy cow, what she ought to do, and the kind of care you ought to take of her, how you ought to arrange her stable so as to get the very best results; and these things ought to be adopted at once by the farmers of the Province, because men in other lines of business adopt improvements as soon as they are found to be profitable. The merchant or manufacturer does not wait very long before adopting new methods and new machinery, because he is after the big profits. I notice in the papers that at least one quarter of our cows are unprofitable—25 per cent of all the cows in Ontario are unprofitable; that means that a lot of these old cows in the herd are not paying their board and they are eating up some of the profits of the other cows that are working hard and giving plenty of milk.

We used to talk of Oxford and Middlesex as the great dairying districts, but now we have to come down to Leeds and Hastings and Prince Edward County and wherever you have good dairymen, the farms are more valuable and you all know that the farms increased in value in these counties as soon as you adopted dairy farming. I had an experience in Western Ontario only a few months ago. A man came out on the road and stopped me and said he was trying to sell his farm and he offered me seventy-five acres of light land which used to produce good crops. It had a good house papered upstairs as well as down, a good barn 40 x 60 and an orchard of two or three acres. He said he was not able to make a living and was working out as a hired man with one horse, and he said he would sell that place to me for $650, and there was fifty acres across the road sold the same week for $500, with a great big house on it that was at one time used for a tavern. It was light land that had been allowed to go down and he was offering it for sale for $1,200. These things ought not to be and yet I feel it my duty to tell you some of these things that discourage us sometimes in our work.

You have been reading about drainage a little and it will pay you to put in tile drains because you can raise 100 per cent. better crops on land that is properly drained and you ought to be willing to spend $20 in draining when you are told that you will get back all you spend in the first or second year in increased production.

I might tell you just here what the Farmers' Institutes, the Dairymen's Associations, the Fruit Growers and the Bee-keepers, and one hundred and one different organizations in the Department of Agriculture are attempting. They are doing what they can for the development of affairs in this province, and if the men on the farm will take what is given to them and not distrust the information that is supplied them by such men as Messrs. Zavitz, Grisdale, Ruddick, and Publow; if you will take these things that they give you and put them into practice for the benefit of yourselves they will justify our retaining our positions at the Agricultural College, or the instructors retaining their positions as they go from cheese factory to cheese factory. They are not there for the purpose of coercing you into things that you do not want to do. These men are big men, and if they just held up their hands the men in the United States would take them at increased salaries.

Now, what are we doing for the farmer's boy? We are doing a work for the grown boy who has had farming experience and then comes to us to learn better methods, but we are not doing very much for very many of them because we have only 1,275 boys and girls from the province of Ontario at the College, and we have two million and a half of population. And there are thousands and thousands of boys and girls at the High School, who get no further education and no education in agriculture. We have a school in operation on the grounds of the Agricultural College known as the Consolidated Rural School, where a boy in the country can get just as good an education as he can in the city.

Two years ago a boy of mine, then fourteen years of age, came to me at that school and said to me, "Father, I have earned five dollars to-day." I said, "My boy, I am glad of it, where did you get it?" And he said, "At the fair, a prize." I asked him how he had got it, and he said that they had a nature study competition for the boys from the rural schools from the county of Wellington, and that he was selected by his teacher, and with forty-three boys from other schools. They had to answer certain questions about farming matters. I said, "What do you know about farming?" and he said, "I don't think I know very much about farming, but I know the questions that were asked me, and I got the first prize." I asked him what he had to do, and he said, "The judges came out and placed a dozen or two apples on the table and pinned a number on each and we had to name the different varieties." I asked him if he could do that, and he said, "Certainly." Then I asked him where he learned the different kinds of apples, and he said, "We bring the apples to the school, and we exchange them with one another, and the teacher will not let us exchange apples unless we know the name, and we are as familiar with them as ABC. You can't fool me. I know the difference between a Snow and a McIntosh." I asked him what else he had to do, and he said, "We have to name the different weeds of the province, and tell whether they were annuals or biennials, or whether you can kill them by plowing them under or whether you had to dig them up. We had to name all the common insects and divide them into classes, those that suck the juice from the inside of the tree or from the flower or leaf, and those that eat with their mouths." I said, "What difference does that make?" He said, "What is the good of putting something on a tree, like Paris green, for an insect to eat when it does not eat, and if he sucks it, you cannot kill that insect with

Paris green." Then he went on to tell about the other parts. And that boy was getting that kind of an education in addition to the ordinary subjects they learned at school, and it would be better if every business man and every preacher, if you like, had a knowledge of these things. When I was at school I was compelled, and it took a good deal of compulsion, to learn certain things by rote, and if I did not I had to stay in after four; and as I did not like to stay in, I learned a good many things by rote. I learned that conjunctive pronouns are those that connect clauses to other words in the sentence, and the noun or pronoun to which the conjunctive refers and joins its clause is called its antecedent.

I could sit in the back seat and string all this stuff off. When the new teacher came on the first of January, as they generally did, I would go over all these things again, and I had no desire to be promoted to a higher class so that I would have to study something else. And too much of that sort of thing is going on in our public schools to-day, with all due deference to our splendid system of education, and we have a splendid system that has been well thought out. And we have people coming from all over the world to our Agricultural College. We have boys there now from twenty-two different countries, and in this perfect system of education that is admired so much. But I want to stop just for one moment and ask yourselves the question: Why should not all the boys and girls in our schools get the same sort of training I have been telling you about that my boy got at the Consolidated School at Guelph? Do you still get the teacher whom you can get the cheapest? I am afraid that you often do. I am afraid that just as soon as the teacher gets a name in the community for thorough and practical work, he is bought off by the next community for an increase of $50 or $75, and it only means a difference of 50c. apiece, and for that extra price you could have retained the teacher who you said gave your boy or girl such a great start in life. When they came home it was a pleasure for them to get out their books and go to work. I would like to see the boys come to our College better trained. I do not like to see boys come to us who have been on a good farm and yet are ignorant of these things that would be useful to them. There is no infectious disease that will make its appearance but the doctors know it next morning by telegraph; but the weeds can get all over our farms from Cornwall to Windsor before we realize the danger, because we have not received the necessary training to enable us to detect them when they appear.

I want to tell you of a new method that is being adopted. The brightest and best teachers who are going to teach in rural schools are excused from the Normal School at Easter and sent to us for the last three months for a sort of top-dressing in this agricultural work, and we give them a special training. The great bulk of our school teachers are now young women, and they take readily to this interesting study of insects and plant life, and they are able to teach it to the boys and girls in the rural schools. But you are not going to be able to get these teachers for three hundred a year. They are not going to equip themselves and come back to the rural municipalities for anything like such a salary, and if it is not worth while to pay the necessary couple of hundred dollars more to get the best teacher, then you have no complaint if the cities and towns get the better teachers and have better schools.

I want to say a word about the girl, the farmer's daughter who comes to us for a three months' course. They often say to me after they get through, "Mr. Creelman, if you had told my father and mother that I should receive anything like the training I have received, before I came here they would not have believed it." They not only learn cooking and sewing and laundry work, but they learn how to do home work systematically, and they go home and are able to do the family washing, and

do it quicker. They learn to save time over and over again, and they get a new dignity in home work and they are able to be what a woman should be, an adornment to the home. (Applause.) Do not say this is for the rich man's son and for the rich man's daughter; it is for everybody. The teachers who are trained at Guelph can be secured at your school if you are willing to pay the little difference that it will cost, and if the farmers will only believe that this work is for their children, for the boy on the farm, and the girl on the farm, and if they will just believe that they have just as much right to ask for this education as the man in the city or the man in the town, then this great work will spread from one end of the Province of Ontario to the other. (Applause.)

IS THE CANADIAN CHEESE TRADE IN DANGER ?

By J. A. Ruddick, Dairy and Cold Storage Commissioner, Ottawa.

[This address will be found under a similar heading in the report of the proceedings of the Dairymen's Association of Western Ontario.]

The Chairman: I am sure you will all be pleased to hear the next address we are to have is from the Hon. James S. Duff, Minister of Agriculture for the Province of Ontario. When I first became engaged with the Dairymen's Association we had as Minister of Agriculture the Hon. John Dryden, under the administration of Mr. Hardy, and I have always said, although a political opponent of the Hon. Mr. Dryden, that he was one of the men that had done much for agriculture and for the dairymen of this Province. He was a very capable man, indeed; and when the change of administration came I confess that I felt some discouragement on that point. I felt that perhaps the Hon. Mr. Whitney would not be able to fill that particular position in the Cabinet, that nobody would fill it with the same ability, that Mr. Dryden had; but, when I came to know the Hon. Mr. Monteith, I felt very much relieved. Mr. Monteith in his term did much for the dairymen in this province, and although coming from the western part of Ontario where dairying is not carried on to the extent it is with us, still he seemed to know and appreciate our wants, and did everything in his power for us. I have always felt grateful to Mr. Monteith for what he did for dairying in Ontario. When the time came when Mr. Monteith stepped down and out, and the position was filled by the present Minister, Mr. Duff, I did not have the same apprehension that I had before; because I had become acquainted with Mr. Duff and I knew he was eminently a practical man, and I knew that he was an enthusiast in the cause of agriculture. I knew that he was a genial man, and a man who would do everything in his power for the dairymen of this country, and I have not been disappointed. (Applause.)

I have had occasion to go to Hon. Mr. Duff a number of times looking for some grant or some legislation that I thought would be beneficial to our Association and to the interests of this country, and on every occasion I ever approached him he would give me a careful hearing, and if possible grant my request. I always thought when he did refuse me that he felt worse over it than I did, and I have always been very grateful to Mr. Duff for what he has done so far. I am extremely thankful that he is with us to-night to speak to us for a short time, and that

you dairymen and agriculturists of this section of the country will have an opportunity of seeing a practical every-day farmer who is devoting his energies to the cause of dairying and to the cause of agriculture generally. I have now much pleasure in introducing to you the Hon. James S. Duff, Minister of Agriculture for the Province of Ontario.

ADDRESS.

By Hon. J. S. Duff, Toronto.

When the speaker arose to address the audience Miss Marjorie Kerr presented him with a beautiful bouquet of roses. He said: I scarcely know what to say to you after the very kind words that have been said of me by your Chairman, and then after the presentation by that beautiful little girl of this splendid bouquet of flowers, which I shall try to take home in a good state of preservation, and after the magnificent reception which you as an audience have seen fit to give me on this my first appearance before the Eastern Dairymen's Association. I have been wondering what I ought to say at this hour of the evening. The hour is pretty well advanced; you have heard two splendid addresses from Mr. Creelman and Mr. Ruddick, and I promise you that my speech will not be quite along the same lines. First, I desire to congratulate the dairymen of the Eastern Ontario Association on the magnificent turnout you have here to-night, and what is most pleasing is the fact that this audience is not an audience altogether of dairymen, and their wives, sons and daughters. I can quite understand it all after going through the streets, and seeing one of your beautiful stores arrayed with a cow and the milk-maid, the churn, the butter-dish, the ladle and all the paraphernalia ready for the work in honor of the meeting of the Dairymen's Association. I can quite well understand that the citizens of this beautiful city are alive to the importance of this gathering, and are welcoming you with open arms. (Applause.)

The thought came to me when President Creelman was speaking that you can go up and down the cities of this fair province—and there is no province in Canada nor yet is there any State in the American Union that has more beautiful cities and towns than the Province of Ontario—but you can go up and down in these cities and towns, you can live in them weeks at a time and watch the movements of the people from seven o'clock in the morning until six at night, and you will find there is more hard work and more workingmen in the cities and towns in the province than on the farms of Ontario. The farmers do not believe that; but if you watch the life of the farmer, he may get up early in the morning and toil all days till late in the evening; but perhaps the next day he quits his work and goes off for a drive somewhere and the next day he is into his work again. He has a variety of work; there is no monotonous work. Take the profession of law; only a few lawyers make a great deal of money. Everybody knows that there are a great many of them do not make very much. (Applause.) Take the doctors, or the merchants, and take all classes of men in business life in Canada who live in our cities and towns, and how few there are of those who have made a success of life. Their brows are wrinkled with furrows from the care, the worry, and the time they have put in burning the midnight oil in order to obtain that competence which we are glad to see them have. When you contrast them with the farmers in the present

day, there is no place to my mind where there is the same average wealth and health that there is on the farms of the Province of Ontario. Years ago if a farmer had a bright boy, he made a lawyer or a parson of him, and the fellow that was a little duller, he was kept at the plow; but to-day the farmer does not look at matters in that way. There is no place in Canada where they require more brains, more thought, and more honest effort than on the farm, and from this time forth instead of a farmer sending his boy who is a little clever to make a parson of him, he will make a farmer of that chap and make a lawyer of the duller boy.

I have one thought with reference to that splendid address given by Mr. Ruddick, and that is that when you have listened to that address carefully all the way through, you are bound to come to the conclusion that this is becoming a great country, and that the cities and towns of Ontario and Canada are becoming large. It never dawned on my mind that we have such a great population in the cities and towns of Canada until about a few days ago I was at a conference at which the Mayor of the city of Winnipeg was present, and he made the astounding statement that, possibly more than one-third of the population of the great prairie province of Manitoba lived within the confines of the city of Winnipeg. That means that one-third of the population of the province of Manitoba are non-producers as far as the soil is concerned. It means that one-third of the population of Manitoba have to buy provisions for themselves from the other two-thirds who take care of the soil, and I am sure the same thing is true of the Province of Ontario. We are quite safe in saying that we have 2,500,000 people in this province, and if you take the city of Toronto, and all the cities and towns west of Toronto up to Lake Huron and Lake St. Clair, I venture to say that there is a million of people in the cities and towns including Toronto and those west of it; and that means a very growing home market. I know you won't accuse me of speaking politically when I tell you that in the old days of the National Policy when I talked politics I never forgot to look forward to the day when we would have an enormous home market, and that is conceded now by everybody; and all you have to do is to look at some of the smaller things you yield. Take, for instance, eggs. When the McKinley tariff was put on and our eggs were shoved out of the American markets they were almost a drug, and our people commenced to look for another market and they shipped to the Old Country. But during the last few years the farmers have been receiving splendid prices for eggs; yet, strange to say, just as Mr. Ruddick told you of the cheese and butter products, our exports are falling off. We are annually shipping comparatively small quantities of eggs to the Old Country, compared to what we did a few years ago, and yet the price is higher than ever, because of the enormous home market that we have.

I might say a word or two to-night to the great bulk of you ladies and gentlemen who are not like Mr. Dargavel and Senator Derbyshire, and myself, travelling around the country from pillar to post, and perhaps doing very little at home. You are busy men and women, and you have not an opportunity of knocking around as we have, and it occurred to me that I might say a word or two of our own province to-night. I sometimes think that we do not take the pride in our province that we should. I sometimes think that we have people in Canada that do not take that pride in their country that they should. I am satisfied I am fairly right when I say I am looking into the faces of people the greater percentage of whom are the descendants of the United Empire Loyalists—descendants of the men and women who rather than give up their love of the flag of old England, that grand old banner that has braved a thousand years the battle and the breeze,—rather than give up

their adherence to that flag that they love, gave up all that they had as far as earthly possessions were concerned and wended their way from the republic to the south of us as best they could into the wilds of Canada and hewed out homes for themselves in order that they might be beneath the folds of the flag they loved. There are other portions of this province in the same position. Go up into the county of Lincoln and the great portions of that territory around Niagara Falls were settled by United Empire Loyalists; the same in Simcoe; a great portion of the early settlers were Englishmen, Irishmen and Scotchmen, so that the province of Ontario was settled in the first instance by the most honorable band of men and women that ever pioneered on this grand earth. (Great applause.) They were noble in character. Those pioneers of 60 or 75 years ago would not be guilty of marking the cheese a little higher than the proper weight. One neighbor would not do another in a deal. They prided themselves in their honour and honesty of dealings, and they left us a heritage that we ought to feel a great deal prouder of than we do. That splendid heritage brings us a greater responsibility; the greater our privileges the greater our responsibilities. It often occurs to me that in this young country of ours we sometimes forget the splendid place that we occupy, and we fail to come up to the responsibility which it involves. I was reading the other day of the great consignments of apples that went from this country to the Old Country during the past year, and I read how many of them had not arrived in good condition and were not properly packed, and I read how apple packers were fined in different parts because they did not come up to the Fruit Marks Act.

It means one or two things, either that the buyers are acting dishonestly and not doing their duty to the people, or else it means that the people who have the orchards knew what was going on, and in order to get a little more money allowed that sort of thing to be done. If there is one thing more than another that we as farmers and business men should do it is to inculcate honesty in our business dealings. (Applause.) I remember one time when at school, a line in our copy-book, "Honesty is the Best Policy." There is nothing as sure as the fact that nations are just as individuals. If the individual people of this country are honest, the nation will be honest, and it will be known all over the world that it is honest. Our trade to-day is in every land and under the suns of every clime, and we should endeavour to instil in the minds of the peole that all our dealings should be fair and honest.

I said we have a great province. Have you ever thought of its resources? I believe that if it were properly farmed and properly handled, this old Province of Ontario, to say nothing of the great virgin country to the north, will hold twice as many people as we have on the land to-day. I find that in every section in the Province of Ontario where the people have engaged in dairying or cattle growing, where they have developed the grain and live-stock, or butter and cheese year by year, it is becoming richer, and year by year the farmer is getting better crops, showing most conclusively that all we require to do is to take proper care of the land and if you do, I believe the land would be better to-day than when the virgin forest was taken off. (Applause.) So that in that respect we have a great mission to perform looking to the future of the agricultural industry of this province. Every dollar's worth of cheese, butter and live-stock means that the food is consumed upon the farm, and has not been sold as it came from the threshing machine, and consequently that farm has not been drained one iota.

One of the things that will strike you in going through the province of Ontario is the great variety of land that we have. If you get on the train at

Windsor and go through to Ottawa you can scarcely believe the different varieties and types of country you will travel through in that distance. In Eastern Ontario you are better adapted for dairying than perhaps any other class of farming. Go up into the country west into the section of country to which I belong, and you will find that grain-growing can be followed with a considerable amount of profit; and then if you go down along the shores of Lake Huron you will get into the fruit belt, and we have a great number of fruit belts in Ontario—the fruit belt along Lake Huron, and the fruit belt in the County of Essex, and the fruit belt towards the Eastern end of Lake Erie and the Niagara River and the Western end of Lake Ontario. In twenty-five years from now there will scarcely be a farm in the Niagara Peninsula that will not be growing fruit altogether, and they will abandon all other kinds of farming operations.

If you take the trolley at Hamilton and go to Beamsville, twenty-five miles, and where years ago they had farms with houses and barns—one hundred and two hundred acre farms—to-day there is scarcely one of these farms left, and it seems to be a continuation of villages, ten-acre farms, five-acre farms, twenty-acre fruit farms. To show you how this is developing I want to tell you something that happened with reference to peaches this year. We had the greatest peach crop that we ever had in the province, and yet peaches were not very cheap. It is only four years ago that two car-loads of fruit were sent to Winnipeg to open up the market in the West, and during this last season over five hundred cars of fruit were shipped out of the Niagara district alone to Winnipeg.

After our Deputy Minister, Mr. James, came home from England this summer, just about the time of the Toronto Exhibition, he said to me, "Mr. Duff, if we could only put our peaches on the English market!" and I said to him, "Why can't we?" And he said, "We have never yet been able to ship them and land them in England in good condition." We talked the matter over for a short time, and then I asked Mr. Hodgetts, the head of our Fruit Branch, to come down and talk the matter over with us. I finally said to him, "Get a bunch of boxes, have the peaches properly packed, and send them to London, supposing they are all rotten when they get there." And he did so, and they arrived in splendid condition, and some of these peaches were sold as high as twenty cents and twenty-five cents apiece. What does that mean? It means helping out the people in the other sections of the province, because they will have to grow the stuff that will be taken up by the peach orchards. It will not only make us more popular, but it will make farming work more interesting from every point of view.

I have only spoken of Old Ontario. What about the North? A few years ago people thought that when they had gone a little north of the town of Barrie or up into the Parry Sound district that they were at Land's End. What do we find? The T. & N. O. line from North Bay to Cochrane, which is the junction of the Grand Trunk Pacific, is a distance of about two hundred and seventy miles. After you pass Cobalt, where we have the greatest silver camp in the world, north of that we have the region that contains minerals in abundance, and as years roll on millions of acres of undeveloped mineral land will be developed, and that will help the people of Old Ontario and of New Ontario to carry on their agriculture. After you leave Cobalt and go a little farther north from there for nearly one-hundred-and-seventy miles, we have almost a continuous belt of beautiful clay land. (Applause.) No man in Old Ontario ever saw more beautiful land than there is in the townsite of Cochrane (applause), and when we are there we are still twenty-five miles south of the city of Winnipeg. What does it mean? It

means that in the course of time we will have more people north of what is known as the rock region than there is in the Province of Ontario at the present time. We have in the clay belt twelve or sixteen million acres of beautiful clay land. (Applause.) It means that we have in that clay belt, as much land as we have in Old Ontario in the district from Toronto to Midland and west, and along the shore of Lake Huron. Draw a line from Toronto to Midland, and then travel from there west around Lake Erie, and we have as much land north of the rock region as we have in all that territory. The fever is dying as far as the west is concerned. You will be surprised when I tell you that our director of colonization this fall had several letters from people who have gone to Saskatchewan and Alberta, who wish to get homes in Northern Ontario, and they have been asking for maps and information. They are thinking of pulling out from the West and settling in Northern Ontario, and all we want to do is to move along the way we are going. We do not want to make mere splurges, but we want a place for our sons and daughters to settle in, and I have no doubt that instead of going to Alberta, Saskatchewan, and Manitoba they will be going to Northern Ontario to make homes for themselves in that great country.

I think it would be unfair for me to occupy your time any longer. I came down here just to express the pleasure of being with you in answer to the invitation of the Eastern Dairymen's Association, and to show my sympathy with the work in which you are engaged; and so far as I am concerned, and as far as the Government is concerned, you can depend upon it, that in every way possible we will be prepared, as the Government has been in the past, to aid the industry which you represent to-night, and every other industry which goes to the building up of this great and splendid Province of Ontario. (Loud applause.)

THE CHAIRMAN: I have a very pleasant duty to perform. There are a couple of presentations to be made to-night, and I will explain how it comes about that they are to be made. Last winter the managing director of *Farm and Dairy*, the paper which is the organ of our Association, instituted a competition for the best farmers in Eastern Ontario, and in order to carry out the scheme solicited subscriptions from some of our liberal men who came forward and helped along this scheme. I am glad to say that two of these prizes have been won by directors of the Eastern Dairymen's Association after a very strong competition. Judging was done on points. A thousand points was given as the maximum number, divided in the following way: The house on the farm was allowed 150, place 150, live stock 200, crops 200, management 150, machinery 75, implements 75. The judges visited the place twice, once in the summer time and once in the winter time. The success of this movement was largely due to the perseverance of Mr. Cowan, the editor of our paper; and when he sets about anything he is sure to make it successful, and also through the liberality of friends of the dairymen. Among these I might mention Professor Robertson, who is known to all of you, and another gentleman who has been a firm and consistent friend of this institution for many years. I have been connected with it for seventeen years, and I have never attended a meeting of the Eastern Dairyman's Association without meeting my friend, Mr. Henderson, who is manager of the Windsor Salt Works. (Applause.) He has always been with us, and he has always helped us some way or other. He has furnished the badges we are wearing here for years, and he has never allowed us to mention it, and I am afraid my neck will be in danger for saying what I have. But I cannot refrain from giving credit where credit is due. The farms in Eastern Ontario were judged by Mr. Ness, a well-known breeder of stock in Quebec. The

judging was thoroughly unbiassed. I am very glad that we have among our directors men who are able to secure these prizes. The second prize was won by Mr. James Anderson, the next was won by Mr. Alexander Hume, of Menie. (Applause.) I shall call upon Mr. Henderson to present one of these prizes, and in the absence of Professor Robertson, I shall call upon Senator Derbyshire to present the other.

MR. HENDERSON: It is quite true that I have been coming here for seventeen years, but had I known the President was going to say the things about me that he has, I should not have been here. It is not very often that I appear on the platform; in fact, it is very hard to get me there, but when I heard from Mr. Cowan the object for which I was asked to come upon the platform, it gives me a great deal of pleasure indeed. Although I am not directly connected with the farm, I have taken a personal interest in farming.

I might talk to you about the greatness of Canada. It is a great country. I might talk to you about the mines in Canada, and I might talk about the great bodies of water, teeming with fish, or I might talk about the great forests that we have in Canada; but, after all, what is the greatest thing in Canada? What does it depend upon? Farms. It is not the mines or the fisheries or the forests, but it is farming. (Applause.)

We all depend on it and rightly so. Canada, to my mind, is going to be a great farming country in the future. Sometimes we forget that, and we think that the great aim and object of life is to get into a city and earn money. But, after all, can it in any way compare with the life of a farmer, especially a dairy farmer? I do not think anybody here will say that, vast and great as this industry in Canada is, that it is anything like what it might be. If you go over to England you will find Canadian cheese there, but you will also find cheese that is made in England that commands three pence or four pence a pound more than cheese that comes from Canada. If we took the care in manufacturing cheese that we ought to, and if we took the care of our farms that we ought to, we would secure the same price for our cheese as the Englishman does for his. We heard last night of the cow that was earning $16 per year as against a cow that was earning $77. If we are going to make Canada great we have got to turn out the best that can be turned out, and if attention is given to farming that ought to be given, in a few years, anything that comes from Canada will be known as the best the world can turn out.

I have been in this country a great many years, and I have been over the whole of it. When I first came out, I was simply horror-stricken when I saw the snake-fences and the weeds growing up, the untidy buildings and dirty barns. Possibly there was some excuse for it in those days, but there is no excuse for it now. Some years ago I spoke to the late Mr. Dryden about this very matter, of encouraging farm improvement by prizes. He said: "Mr. Henderson, it is a great undertaking; nothing of that kind could be done." I said: "I think possibly it can be done in sections." He replied: "It is too large an undertaking." However, I am glad to know that Mr. Cowan had the energy to initiate a movement of this kind, for I do not know of anything that will tend to improve the state of our farms more than a competition of this kind. I am very glad indeed to know that a friend of mine, coming from Prince Edward County, has won second prize. After all is said and done, it is something to think that, over the whole length and breadth of this Province, he has been able to put his farm and buildings in such a state that, in competition with all others, he has won second prize. (Applause.) It is something to be proud of. It means something to the whole country

at large. These farms that won these prizes will be an object lesson for other farmers in the neighborhood. They will want to go and see how it was that Mr. Anderson was able to win a prize of this kind, and they will try to improve their farms and come up to his. It affords me very great pleasure indeed, Mr. Anderson, to hand you this prize (great applause), and I hope your children in years to come will recognize the fact that their father, in competition with the whole of Ontario, was able to win such a prize as this.

Mr. Anderson: I can assure you that it is a pleasure and a pride to have a silver tea set of this kind from a gentleman like Mr. Henderson. No farmer that I ever talked with has given me better information than our good friend, Mr. Henderson. It is not always that you get the best points from a farmer. You can get good help from such men as Mr. Henderson. I would like to say that while I have won second place in this dairy competition, there is not a dairyman in Eastern Ontario who cannot do better than I have done. The easiest way to make money on a dairy farm is to take a cow that is earning $25 and make her earn $70 or $75. These things I have done, and I know others who have done better still. I was brought up in a way that when I undertook to do anything it was necessary to keep the best of company in order to do it, and I say here to the dairy farmers of Eastern Ontario that you cannot be in better company than you are at a meeting of this kind. (Applause.) I thank you, Mr. Chairman, for this magnificent present.

Senator Derbyshire: I am sure we are delighted that these prizes have been given to two of our directors. We are delighted that they have taken such a high position. There is nothing too good for the farmer; do not make any mistake about it. It is the farmer that ought to have the good places, and we are delighted that they have such beautiful homes in Ontario. I am proud to know, Mr. Hume, that you have a herd in such beautiful condition, and that you have sent such a large quantity of first-class milk to the factory, and that you have come in third in connection with this prize competition. I find that the man that got the first prize only had 830 marks, and he got some large marks on account of his beautiful home, and on account of his lawn. Friend Anderson had 821 points, and you have 805, and we find that you lead them in connection with your dairy herd, and I am prouder of that than anything else in connection with this business. I want to say to you that there is nothing in connection with the Province of Ontario that shows up like the prosperity of the dairy business of our country. We have sold our cheese at a higher price, and we have the cows that will produce the milk that will make a fine quality of cheese, and we want to make a better quality of cheese and increase the home consumption. When we had high flavored butter the father and mother would set a good example to the children and eat a small quantity of it, and the beloved children could not eat the butter at all; and the butter remained on the table festering from day to day without any consumption going on. But with the fine quality of butter we are now making they are using more of it all the time, and the children are eating ten times as much of this butter as they did before, and we are sending carloads of butter to Winnipeg, Vancouver and Victoria. Keep your dairy herd up, my brother, and raise the standard from year to year; increase the facilities in connection with your own farm! I love to see the farmers come into the town of Brockville with their clean buggies and nice horses and drive past those people who live in the cities and starve to death. I say to you farmers go on, build up the country and build up this great Province of Ontario. We are the great pivot

of federation; four Provinces to the East and four Provinces to the West. We have two millions more money in the bank this year than we ever had in the history of the country. (Applause.) I have very great pleasure in presenting this prize to you, and I am delighted that our friend, Mr. Henderson, contributed $200 to help this cause on. When you take that home to your beloved wife, smile on her, and make her cheerful. (Applause.)

Mr. Hume: This is one of the pleasures of farming, and I know of what I speak. There is no other occupation that you can take the same pride in that you can in farming; watching the growing crops and the animals in your herd; watching all these things grow up controlled by yourself. There is a great deal more pride in that than there is in handing goods over a counter. I have a near relative a merchant, and another a doctor, and another a principal of a high school, and I would not change positions with anyone of them. I feel satisfied we have the best occupation. We farmers look down upon ourselves and we are now beginning to realize the position that we occupy. (Applause.)

PRESENTATION TO JOHN R. DARGAVEL, M.P.P.

Senator Derbyshire: We have had the real pleasure the last two years of having our friend, Mr. Dargavel, as our President. He did the work so nobly and well that we have been delighted with the service he has given us, not only as chairman of our meeting, but in presiding over our Board and helping to promote the dairy interest of our country. While he has been connected with this Association for seventeen years, every position we have asked him to fill he has done it with great acceptance to us and great advantage to the Province. For the last two years he has filled the position of President of this Association, and having a seat on the floor of the Legislature, he has been able to bring the matters before the Minister of Agriculture with prominence, and we have been able to do great things for our business. When I was president I tried to lift the tax of $15 on our cheese factories We used to get a small grant of $4,000, and we had to raise $12,000 ourselves to carry on the work of dairy education when there was no reason why it should not be free, the same as any other education. We elected Mr. Dargavel President of the Association and we got him on the floor of the House, and now dairy education is free in the Province of Ontario through efforts that he has put forward. He has retired from the position of president, and we have elected him honorary president; every man in the room voting for it, and we are going to have his influence and co-operation in the future the same as we have in the past.

On behalf of the Eastern Dairymen's Association and the dairymen of Ontario, I have very great pleasure in presenting this gold-headed ebony cane and this beautiful brass inkstand, paper knife, blotting pad, clock, and other articles. We love you on account of the dignity of your person, and on account of your simplicity and the pureness of your life, and on account of your eloquence, and the great service that you performed in advancing the dairy interest of Eastern Ontario. (Great applause.)

Mr. John R. Dargavel: I wish I was possessed of that eloquence that you have just spoken of. I would like to have it at the present time to say to my friends how thankful I am, and how proud I am of the presentation that has been made. This is totally unexpected, and is a great surprise. I was not looking for anything of the kind, and I am not deserving of anything of the kind. Really, I

do not know what to say. Even if I were possessed of some kind of eloquence it would surely fail me at the present time. It is the second time within a few weeks that I have been put in somewhat the same position. At the election of directors in my own county a short time ago I declined to be re-elected, and an altogether too fine and altogether too flattering resolution was passed at the meeting, and I was totally unable to reply. It was just as much a surprise at that time as this presentation is now.

Whatever I may have done for the dairymen and the dairy interest in this Province, I have done with pleasure. It is not nearly as much as I would have wished to have accomplished, and when I was urged to act as director and president of this Association some time ago they were kind enough to say that I would be useful to the Association on account of my connection with the Legislature. I replied to them, and I say now, that no matter whether I occupy any position in connection with the Association, that I will do willingly and cheerfully anything I can and to the best of my ability on the floor of the House for the dairymen. So long as I can find a dollar to pay my annual membership I intend to remain a member of the Association. I really cannot find words to express my gratitude to my friends. I have been connected with the Board for some seventeen years, and I have never met with anything but the most extreme kindness from the members of the Board and from the members of the Association. My connection with the Board has been of the pleasantest. In all that time there has not been the slightest friction. There had been a little previous to that time, but since then, I am glad to say, everything has been very smooth sailing, and I have never known a member of the Board who was not trying to do all he could for the interest of the Association. Many of you people do not know the influence that is exercised by the Dairymen's Association, and I can say this without being egotistical, from the fact that I am, to a certain extent, severing my connection. From the time I have been connected with the Board it has grown up from a small plant to a large and luxuriant one.

We have had every assistance from the Governments, both of Ottawa and Toronto, our connection with both these Governments have been of the pleasantest kind. They always seem anxious to help the work that we have in hand, and I think that our Association has been of assistance to them. I shall treasure, Mr. Senator, ladies and gentlemen, these mementos as long as I live, and shall leave them to my family. It will be with pride that I can point to them in the years that are to come and say that my efforts, however poor they have been, were appreciated. It will be an incentive, I am sure, to my children and, perhaps, to my children's children, to do what little they may to advance the cause of this great Province of Ontario. I thank you, gentlemen, for your kind remembrance. (Applause.)

ROUGH FORAGE FOR DAIRY CATTLE—HOW AND WHAT TO GROW AND HOW TO USE IT.

By J. H. Grisdale, Ottawa.

Our keenest rivals in dairying are Holland and Denmark. These two small corners of Europe are blessed with soil and climatic conditions no better than maintain in Eastern Ontario. When it comes to buying feeds the Dane and Dutchman must come to us, pay our prices and then transport 4,000 or 5,000 miles. We Cana-

dians are usually satisfied with 20 to 25 cattle to the 100 acres. The Danish and Dutch farmers want from 75 to 100 head. They feed all these much better than we do our few. They grow all the roughage. We naturally ask how they do it.

The answer is simple. In the first place these men cultivate their farms. We usually make but a feeble pretence thereat. In the second place, they grow the right crops and grow them well. We grow similar crops but handle them badly. The crops these men can grow most advantageously we can produce in even greater abundance and with greater certainty. Besides we can grow cheaply, easily, a crop that never fails, corn.

We could grow clovers, grasses and all other forage crops as well as any Dane or Dutchman, but we don't. We should. Until we do we are not going to make the mark we might in milk production.

So much for crops. Of cultivation I may not speak. One would think we would all know enough to do that well. Well, we don't. We are sadly lacking.

Every Canadian farmer interested in dairying should, for patriotic reasons, if for none other, try to beat these Danes and Dutch at their own game. This would be one case at least where patriotism would pay dividend in dollars and cents. Let us consider the matter of producing better forage and more of it on our Eastern Ontario farms.

In the first place we must do our farm work better. Every extra hour's work spent upon the field pays high wages. This is true, of course, up to a certain point. I have never yet been able to determine just where that point was. It has always seemed to me that I might profitably have gone on a little longer. I believe the last extra hours are the most profitable hours spent on the field.

As probably the most important crop for the Eastern Ontario Dairyman stands pasture.

Pasture grass at the right stage and in abundance has no superior as a dairy ration. But at best it is expensive, while generally it is a ruinously extravagant method of feeding. However, we all use it more or less, and much may be said in its favor, so what we cannot stop, let us try to mend.

Leaving rough lands or permanent pastures aside, not one farmer in a hundred in my experience makes the least effort at special preparation for pasture. The results are quite up to the preparation, the cows starve and the farmers blame the weather.

Permanent pastures on arable land are not practicable, much less profitable. Hence a combination of meadow and pasture preparation seems really the thing. Good meadows and rich pastures are not spontaneous. Besides the good meadow does not necessarily lapse into the good pasture in a year or two.

A great variety of grasses might be used for either hay or pastures. I have noticed that the more complicated any plan offered for improvement the fewer farmers pay any attention to. I personally have the same disinclination to follow any scheme that looks complicated, and I don't do it if anything simpler can be devised. Let me give you my plan for securing a good meadow, and later a first-class pasture.

Prepare the land. Begin to prepare the land the year before seeding down. That is, manure and grow a hoed crop if possible. If a hoed crop is out of the question and manure is scarce, then plow from sod with a shallow furrow in late July or early August. Work well with roller, disc harrow and cultivator. Do not hesitate to work it often. Do not forget to work it well. Do not fail to work it at frequent intervals all autumn. Replow with a slightly deeper furrow, or better

still, ridge up with double mould board plow in October after sod is well broken down or rotted. Leave this all winter.

Prepare for seeding by levelling with spring tooth, stiff tooth or disk harrow. Smooth-harrow and roll. Sow two bushels oats, one and a half bushels of barley or one and a quarter bushel wheat per acre. Sow grass and clover seed at the same time or the same day. If land is very dry harrow grass seed in with very light harrow and roll. If land is moderately dry roll only after seeding. If land is moderately moist neither roll nor harrow at the time of seeding, but leave till grain covers the ground, then roll in fairly dry time.

A most important consideration is not to forget to sow the grass and clover seed. Very few of us forget entirely. The great majority of us forget about half or more, and very many of us forget very nearly the whole thing. It costs quite a bit to remember in this case. I have a suspicion that is why we so frequently and so easily forget. Forgetting is really more expensive, if we would only stop to think or watch results.

The common grasses and clovers are the best to sow. Timothy brome grass, cock's foot or orchard grass, rye grass, mammoth clover, red western clover, alsike clover and alfalfa are all suitable. The soil, the field and the purpose in view should influence the choice. Thus, little use sowing cocks-foot on light soil; no use trying alfalfa on badly drained land, and mammoth clover is rather unsatisfactory for late summer and fall pasturing. For average conditions, timothy, red western and alsike clovers will give best results.

Sow enough seed. Sow twelve to twenty pounds timothy, three to five pounds alsike and eight to twelve pounds red clover per acre. If you hesitate about sowing so much, sow a little more. If your soil is fairly rich and well drained add a few pounds of alfalfa per acre, say five or six pounds. A couple of pounds of mammoth in place of as much of red clover might be advantageous. In heavy clay soil four or five pounds orchard grass would do good.

The average seed drill grass seeding attachment won't sow this much seed. Sow it by hand or by means of special grass seeder. Divide the grass seed mixture into two equal parts. Sow each part as to entirely cover the field. Sow the first half of the seed lengthwise, then sow the second half crosswise the field. The first half might be sown from the grass seed attachment on the grain drill, the second half by hand across the seeder rows.

The expense may seem prohibitive and does, I know, usually deter from this style of seeding. Such a seeding, leaving out the alfalfa, might cost from $2 to $3 an acre. The returns will be from ten to twenty dollars per acre better either in hay or pasture each year than from the average seeding. I have tried both ways for many years. I know. Try it. Then when you have the pasture use it wisely. Pasture down fairly well, but not close. Give it a chance either by having enough pasture for the whole herd, or divide the herd, or else divide their attention by giving the pasture a few days off now and again as needed.

So long as we continue to practice summer dairying almost exclusively as we do at present in Eastern Ontario, methods of summer feeding must be more important than methods of winter feeding. Good pastures are of value, but even the very best of pastures run short in times of drought. Then how shall we supplement? First and best by the summer silo. Cows always welcome good ensilage; or, next best, by various soiling crops.

The summer silo means corn for ensilage. Corn for forage is easily the most dependable, the most profitable and the most economical forage crop in Eastern

Ontario. Growing much corn means good farming. Good farmers are sure to grow corn abundantly.

Growing corn well means a number of things. Foremost a well drained field is necessary. This field is likely to give best results if it was in clover hay or pasture the previous year. An application of barnyard manure is almost an essential. It should be so applied as to very near the surface when the corn is planted. The corn should be planted only when the land is in perfect tilth and warm.

To get best results right varieties properly sown is the word. Longfellow, White Cap, Yellow Dent and Leaming may be safely counted on all over Eastern Ontario. About equal areas of each will give good results. Sow thinly in rows 42 inches apart or in hills 42 to 48 inches apart. Keep well cultivated and free from weeds from start to finish. Ensilo when in dough stage. Feed when necessary.

To feed add cut straw and a bite of long hay. Suitable meal to feed along would be bran, oil cake meal, corn and barley, equal parts. Cotton seed meal, gluten meal, peameal or distillers' grain might replace the oil cake meal.

After corn come the soiling crops.

As king of soiling crops, where it can be grown, stands alfalfa. If your corn field was kept clean, is in good heart and lies gently sloping, or is fairly rolling, sow the alfalfa there. Sow a small area to begin with. Sow a goodly amount of seed, 20 to 25 pounds per acre. Inoculate the soil or the seed if possible. Every ton of green feed from the alfalfa field is worth half a ton of milk, every ton of hay is worth a ton of bran or thereabout. As an inspiration to milk production on the part of the cow consuming, it is a marvel. Feed some dry forage along with green alfalfa. Clovers mixed or separate follow alfalfa fairly closely, and are somewhat more easily grown on the average farm. They, like alfalfa, only in a lesser degree, inspire the cow to renewed effort at the pail. Feed some dry forage along with clover just as with ensilage and alfalfa. As makeshifts and good old standbys come our friends the mixed crops. Peas and oats; oats and vetches; peas, oats and vetches; peas, oats and barley; peas, oats, vetches and millet; peas, oats, vetches and Hungarian grass; and peas, oats, vetches, millet and sorghum, to say nothing of innumerable other possible and commendable combinations Their great value lies in their certainty. Sow thickly three to five bushels per acre. Feed when just beyond the milk stage. Too early means a loss of food value, too late means incomplete consumption. As an early ready soiling crop fall rye is of value. Another advantage is it does well on lands so poor other crops will scarcely grow. Sow one bushel per acre in early September. Feed moderately for fear of flavor.

As roughage for winter use corn ensilage again stands first. The addition of roots makes matters still better. For milk production, everything considered, mangels are probably the best.

To grow mangels necessitates suitable soil, well fertilized and well tilled. Plow in August with shallow furrow, work at intervals, manure, replow with shallow furrow and subsoil hook. Sow early, as early as ever you can. Sow on the flat or on ridges thirty inches apart. If on ridges pack well before seeding. Sow plenty of seed, seven to nine pounds per acre. Mammoth long red or gale post varieties are best. Keep clean, cultivate frequently. Harvest before heavy frost. Feed along with ensilage, or alone if preferred. Best if fed along with corn ensilage.

As to clover hay, alfalfa and mixed crops for hay for winter feeding, remarks on these crops for soiling will apply.

Romain millet and Hungarian grass complete the list of the more common and the more advantageous crops for winter forage. These are of value, first, because in case of adverse weather conditions preventing other crops being grown they may be sown even as late as early July, and still give satisfactory results. The soil must be worked well before seeding. It should be very mellow, very fine and yet very firm under foot. Sow thirty to forty pounds per acre. Roll the land after seeding. Cut when in blossom, or shortly thereafter. As a feed for milk production it ranks very high, being about equal to clover, ton for ton.

Q.—How much seed should you sow?

A.—Put in a good seeding. When you come to the timothy bag allow from ten to twenty pounds of timothy per acre, according to conditions, and allow from two to four pounds of alsike, and from eight to twelve pounds of red clover per acre, and if the land is a nice sloping field with the soil in good condition, put in four or five pounds of alfalfa, or a little more per acre, and you will be well satisfied with the result you will get for the slight extra expenditure.

Q.—Don't you have to keep your corn together when you are going to feed your silo?

A.—If you only have a small area. We grow about fifty acres every year, and it takes quite a little while to cut it. I would like to see every farmer grow that proportion of corn. We have a 200-acre farm, and we grow fifty acres of corn, and I would like to see every farmer who owns 100-acre farm grow twenty-five acres of corn. You will say, "Where are we going to get the manure?" That may be the trouble for the first year or two, but that will soon right itself, because you will be able to keep a lot more cattle. We can grow roughage with any other country under the sun. We have ideal conditions for growing feed in this country, and if we will cultivate our fields and crop them in the right way, we will have a solution of the whole problem.

Q.—Do you cut the hay and straw?

A.—No, I feed the hay long. I do not like to cut the hay, but I would cut the straw.

Q.—Is green alfalfa better to feed in the summer than corn?

A.—Yes, it is better.

Q.—What do you think of silo alfalfa for summer feeding from the first of July until the corn comes in the fall; would that give better results than feeding alfalfa green?

A.—No, I would not silo alfalfa. My experience is that we lose anywhere from thirty to fifty per cent. I do not know just how, but I find that we lose that proportion; therefore, I would say, feed alfalfa green, or else cure it for hay. There is no difficulty in growing alfalfa for hay, and alfalfa is such a rapid growing crop that if you have five acres and you are feeding it green, by the time you get over a five-acre field, the first side is ready to cut again. I had a herd of sixty cattle on a fourteen acre field last year, and we made it carry them until the end of July. We divided that field and gave them eight acres on the one side, upon which they ran, and on the other side we kept a strip alongside the fence and fed them, and by the time we got to the end the other end was ready to cut again.

Q.—You did not really pasture them?

A.—We pastured eight acres, and then fed the other six acres until the end of July, and then we gave them the whole thing.

Q.—Tell us how you manage the 200 pigs you have there; do you feed mangels?

A.—Yes, we feed these 200 pigs between 50 and 60 tons of mangels and sugar beets, and we have ten acres of pasture that we run as a pig farm.

Q.—Do you have ten acres set apart for pigs?

A.—Yes. We follow a three year rotation. The first year roots, second year mixed crops, seeding down with different mixtures. We have tried two kinds of grass mixtures and clover mixtures. We cut a crop early if it is going to fall; if it stands up, we let it ripen, and then the next year the pigs are pastured on that grass and clover. They have runs running right across, and in that way we get a variety of feed for the pigs, each run is a little over three acres.

Q.—Do you feed them mangels in the summer?

A.—No. We depend on the corn crop; we depend on rape and things like that. Let the winter look after itself, and get after the summer. I believe that is why we are weak in Eastern Ontario. We are too prone to look after the winter and forget the summer. We say cows can get enough; let them run and they will find it. But they cannot, because it is not there. We have got to get the feed for them in the summer, and if every cheesemaker and buttermaker in Eastern Ontario would get after the farmer and get them to provide feed for their cows in the summer you would not have 3,000 pounds factories, but it would be 5,000 or 6,000 pounds. The idea of depending on pasturage is ridiculous in my experience. If you take the feed condition in Eastern Ontario it will take three acres to keep a cow right, and what farmer can afford three acres to pasture a cow. We must supplement that pasture with some soiling crop. We are cheesemakers in Eastern Ontario, and we must get the milk in the summer, and to get the milk in summer we must have good pasturage and soiling crops.

Q.—Do you use a horse planter for corn?

A.—No, I use a common seed drill.

Q.—How much seed to the acre?

A.—About half a bushel.

Q.—Do you plant the corn in drills?

A.—We plant the corn in rows 42 inches apart, seven or eight inches in the rows or in hills 42 inches apart each way. You will get just as good results, and it is a little nicer to harvest in rows and a little easier to keep it clean in hills. If you have dirty fields I would advise planting it in hills.

Q.—What do you use for fertilizing for mangels?

A.—Just ordinary manure we put on from 15 to 20 tons per acre.

Q.—Rotted or fresh?

A.—Fresh every time. Do not use rotted manure. A ton of rotted manure is not worth any more than a ton of green manure, and to make a ton of rotted manure takes two tons of green manure.

Q.—Is there not more fodder from rotted than fresh manure?

A.—No.

Q.—Do you hoe any corn with the hand-hoe?

A.—Yes, we do; I think it would pay any one to do it. You cannot get quite as close to the corn with a horse-hoe. Being on an experimental farm we probably give a little more attention than the average farmer would, and when our corn crop is off, we want our fields to look as if we had been growing corn and that is what it does look like; there is nothing else there.

Q.—How do you mix this millet and sorghum?

A.—I take about equal weights of Hungarian grass, millet and sorghum, and use about ten pounds of each and mix them together thoroughly and sow by hand about thirty pounds to the acre. If you use Hungarian grass alone you want to use about ten pounds, but if you mix the three it is not necessary to sow quite so much.

Q.—How much corn do you plant per acre?

A.—If you sow in rows you will need to use about half a bushel, if you sow in the drill about 42 inches apart, you can get along with ten or twelve pounds.

Q.—You would not get many ears, sowing half a bushel to the acre.

A.—You have to thin them. Put your rows 42 inches apart, and cut out eight to ten inches in the row. I recommend sowing a fairly good seeding for the reason that there is always more or less corn that does not come up, and if there is a miss anywhere it looks bad and you lose that much land. I am a strong advocate of a good heavy seeding and you can very much more easily eliminate some of these plants than you can replace them. It is a little more expensive but on the average of ten years we find we can grow a crop including rent and manure at $6 an acre for the manure and rent, for about $18, and in ten years the corn has averaged us somewhere around 16½ tons per acre, and when you can grow corn for a little better than $1 a ton, on an average, including rent, labor and every minute spent as well as cost of manure and land, you are doing pretty well. I say the average farmer can do it better than we can, because we have to pay high wages.

Q.—What is the cost of filling the silo?

A.—That is included. I have ten years' figures, of which we keep an exact account every year. We do not give you the good years and keep out the bad. We know that is the average cost in the silo. I calculate that it never costs over $1.50 a ton, and it very often comes down to $1.10 and $1.25 in the silo. If you put in 200 tons you will probably get out 160 or 150. You lose quite a lot. I do not know where it goes but it goes.

Q.—Do you try to get the corn in the silo, as soon as it is cut?

A.—There is no harm in allowing it to lay out a day or two. We have a pretty strong gang of men, and we can take our men from each department, and we cut for a couple of days before we start, and then we pitch in and by the time we have cut a week we catch up. We run our harvester with two teams, and start early in the morning and work late.

Q.—How many pounds does it take to feed a cow?

A.—We have cows that weigh 600 pounds and cows that weigh 1,800 pounds. We do not feed the same to each. Take the average cow and she will use about 50 pounds of the mixture a day. We feed it twice a day, in the morning and at night. We do not give them anything at noon.

Q.—Do you mix any cut straw with the ration?

A.—Yes; fifty pounds of ensilage, twenty-five pounds of roots and five pounds of cut straw, and we feed the corn on the top of that. If the cow is milking fifty pounds a day we may give her ten, or twelve pounds of meal. If she is only milking ten pounds a day she does not get much meal.

Q.—Do you not feed the dry cows any meal?

A.—About five pounds a day.

Q.—You have plenty of men. Do you think it would pay to have these men cut the corn by hand?

A.—We have been experimenting with them for some years, and we find that we lose about half a ton of corn by cutting with the binder. A man will only cut about an acre. The men just work the regular hours, and if the foreman is not looking they do not get a hump on them.

MR. DARGAVEL, M.P.P.: We have men in our section that will cut five acres a day.

MR. GRISDALE: Send him down here and I will pay him $5 a day.

MR. DARGAVEL: I have a man that will cut five acres a day by hand, but he is no good for anything else in the world.

Q.—Do you feed clover hay in connection with that feed?

A.—Yes, but not very much.

Q.—How many pounds?

A.—Four or five pounds a day. We would feed more if we had it, but when you have twenty horses you would be astonished how many tons we use. You will get better results if you feed clover with the ensilage. Ensilage is not a good food in itself, but it helps other foods.

Q.—There is a fermenting element in there that helps digestion. Is not the binder twine injurious to the ensilage?

A.—No. We never had any trouble, except one time a fool calf thought that binder twine was hay, and after we opened it we found a ball of twine inside.

Q.—Do you recommend feeding twice a day?

A.—Yes, we have tried it over and over again and twice a day is enough.

Q.—Do you pulp the mangels?

A.—Yes, when we feed them with the ensilage, if you have a cow that is giving an extra supply of milk; for instance I was testing a cow last year that was giving sixty-five pounds a day of five per cent. milk, that cow was working, and I used to give her a little bit of mangels between meals, and a little bit late at night; we encouraged her.

Q.—I suppose you would not cut these mangels?

A.—No, I gave them to her whole.

Q.—Is there any rule for estimating the amount of corn in a silo?

A.—Find the cubic contents and multiply that by about 45 and that will give you the contents, forty-five pounds to the cubic foot after it has settled. If it has settled for a long time it may weigh a little more. The height of the silo has something to do with it, but there are not many low silos now.

Q.—That would be a thirty foot silo?

A.—Yes, if you get a forty foot the silage is densely packed at the bottom.

Q.—Do you prefer finely cut ensilage or coarse.

A.—The finer it is the better and the more the cattle will like it.

Q.—Is there more leakage?

A.—I think there is.

A MEMBER: I am feeding finely cut ensilage, and I find the cattle like it better than the coarse.

Q.—At what stage do you prefer to cut the corn?

A.—About a week after you would like to eat it. I do not like it ripe.

Q.—Would you run the risk of frost?

A.—I have not found that frost does a great deal of harm except that you lose weight.

Q.—After a heavy frost wouldn't you lose the leaves?

A.—You lose the juice, but you have the dry material there, and it is not such a high feeding value. One of the best crops of ensilage I have ever seen

growing, was grown by Mr. Ness. He had a field of corn that was about ten or fifteen feet high, and the frost came along and froze it. He got disgusted and left it standing there and never touched it until after the Exhibitions were over. Then he went home and cut it. I saw it in the winter, and it was the best ensilage I ever saw. Do not stop feeding corn for fear of frost. It won't hurt it.

Q.—Do you not get more corn in a silo by cutting it finer?

A.—Yes.

Q.—Do you mean you will have forty-five pounds to the square foot if it is cut fine?

A.—I mean the average. You can usually get fifty pounds to the square foot if you cut it fine.

Q.—Should the silo have drainage?

A.—Yes, at the bottom, punch a few holes in the bottom or have no bottom at all except the soil and let the moisture leak out.

Q.—Would you have holes in the bottom for the rats to come in?

A.—No. I would have them smaller than to let rats in.

Q.—Are you troubled with rats?

A.—No, because we do not let them in our silos. They are rat proof, but I have seen silos where they were troubled with them.

Q.—What breed of cow was it that gave sixty-five pounds of milk a day, testing five per cent?

A.—She was a good breed all right.

Q.—How was she bred—a Holstein or an Ayrshire?

A.—A pure bred Ayrshire.

Q.—How long were you milking her when you made that test?

A.—When she had been in milk about a month she was giving that.

Q.—Why is it that you do not keep any Holsteins in Ottawa?

A.—I have nothing to do with that.

Q.—Did she continue that for seven days in succession?

A.—Yes. She averaged sixty-four for some days in succession, testing 5.1 per cent. for an average of seven days (Applause.)

THE CHAIRMAN: I am sure there has been no address that we have heard during this Convention, and we have heard some very good ones, that is of more importance to the dairymen and the agriculturists of the province than the one we have just heard. I would like it to get into the hands of every dairyman in the province of Ontario; it certainly would have a wonderful effect.

SENATOR DERBYSHIRE: In going through eighteen districts last year, Mr. Glendinning and I found that the weak point was the production of food for the cattle. They were suffering for want of feed to carry the cows through the summer time. I want to say that the most important address that has been given is the one we have just listened to. It is all right enough to make good cheese, and have nice factories and inspectors, but the first important thing is milk. You must have milk to run these factories, and you must have it in large quantities. If not, the factories cannot make a profit. This address has been delivered by a man who knows what he is talking about, because he is doing it every day.

I went down to the Macdonald Farm this summer, and I saw three plots, and written on one stick was the word, "Ordinary Farming." The grass was poor miserable stuff, and right there beside it, was the sign, "Intensive Cultivation of the Soil Without Manure." And in that plot the grass was up a foot high, right

beside the other stuff where it was run as an ordinary farmer does it. The third sign was, "Intensive Cultivation of the Soil, Under-drainage and Proper Manure." Everything had been done to give it a growth of the most vigourous kind, and there they had a cedar swamp of grass two feet high and growing vigourously.

You can speak for fourteen hours to an audience, and you cannot tell what these three plots of grass meant to the people of Canada. But one look would tell you what it meant, and I want to get it into your minds that you should get right to work when you get home during this year 1910, and give your land that intensive cultivation.

SECRETARY'S REPORT.

By R. G. Murphy, Brockville.

I am again privileged as your Secretary to give an annual report of our doings as an Association, which is much easier done when one feels as if something has been accomplished during the year. I wish, at the outset, to say that much good has been accomplished in the interest of the dairy business.

The report then went on to speak of the organization of the Board of Directors selected last year, and the appointment by it of an Executive Committee, and then proceeded to say:

The first meeting of this Executive Committee was called at Kingston, on the 12th of February, when the following questions were taken up and discussed, namely:—The Dairy Farms Competition, the licensing of Cheese Factories, the granting of certificates to makers, the appointment of Public Prosecutors, the Dairy Herds' Competition, and other matters pertaining to the industry.

I regret to say that our dairymen of the East did not take as kindly to this new departure (the Herds' Competition) as we had hoped they would, there being only sixteen applications in all, and only nine of these sent in reports.

We divided our territory into five Districts, having due regard to the number of factories.

District No. 1 being composed of: Peterborough, Ontario, Durham, Victoria, Haliburton, Northumberland, and Hastings, less the three Townships of Sidney, Thurlow, and Tyendinaga.

District No. 2: Prince Edward, Frontenac, Lennox and Addington, and the Townships of Sidney, Thurlow and Tyendinaga.

District No. 3: Leeds, Lanark and Renfrew.

District No. 4: Carleton, Grenville and Dundas.

District No. 5: Glengarry, Russell, Stormont and Prescott.

In District No. 1, Mr. J. Gordon Mann, of Bridgenorth, with a herd of eight cows is the winner of the first prize, the average pounds of milk per cow for six months being 5,991¼ lbs.; Mr. William Whitton, of Menie, with a herd of eleven cows, second prize, with an average of 5,140 4-11 pounds per cow; Mr. Thomas McCoy, of Cooper, with a herd of twelve cows, third prize, with an average of 5,030⅓ pounds per cow; Mr. William Smith, of Lakeport, with a herd of eight cows, fourth prize, with an average of 4,495½ lbs. per cow.

In District No. 2 there was but one entry, which was made by Mr. J. W. Duffett, of Adolphustown, whose herd of ten cows produced 6,168 pounds per cow, this being the highest number of pounds produced by any herd in all the districts.

In District No. 3 Mr. Andrew Henderson, with a herd of thirty cows, produced 5,068 2-5 pounds per cow, and Mr. A. M. Ferguson, with a herd of twenty-one cows, produced 4,825 pounds per cow.

In District No. 4 Mr. Henry Davidson, of Prescott, with a herd of fourteen cows, which produced 4,074 11-14 pounds per cow.

In District No. 5 Mr. D. H. McDermid, of Avonmore, with a herd of nine cows, which produced 4,809 pounds per cow, was the only entry.

About twenty district dairy meetings were held during the months of November and December, and except in the case of a few of those held early in November, the attendance was good, and more interest of a general nature than ever before ws taken by the dairy farmers. At these meetings they were shown that there is an urgent need for a cleaner and purer milk supply at our cheese factories and butter factories, and whilst we cannot say that an ideal condition has yet been reached, yet we find a marked improvement in many localities.

Much valuable work has been done by the Instructors during the season, and they have apparently gained the confidence of most of those with whom they came in contact in the dairy business. They have in most instances been well received by the managers of the various factories, which has tended to make their work not only pleasant but also profitable to those whom they desired to assist.

The following are the names of the gentlemen who have been selected by the vote of the people to compose the Board for 1910 and the county or counties which they represent.

I hereto append a list of our members for the year 1909, each member being entitled to a copy of "Farm and Dairy."

I have discharged the duties of Secretary to the best of my ability, but I can assure you that the work has been pleasant, having been made so by the hearty co-operation of the Board and their forbearance. To all I tender my thanks.

THE CHAIRMAN: This is a very good report indeed, and I think we have every reason to be proud of our Secretary. (Applause.)

Moved by HENRY GLENDINNING, seconded by MR. J. HYATT, that the Secretary's report be adopted. Carried.

RESOLUTIONS.

Moved by R. G. MURPHY, seconded by J. A. KERR, "That whereas the success and educational value of this Convention is largely due to the presence of the speakers, who have so ably addressed our meetings, we desire to express our sincere thanks for their kind assistance and presence throughout the various sessions." Carried.

"That we, the Members of this Association desire to express our appreciation of the kindness of the Mayor and Council, and citizens of Belleville generally, for their co-operation in helping to make this Convention a success." Carried.

"That the thanks of this Convention be hereby tendered to the Canadian Salt Company of Windsor, Ontario, through their general manager, Mr. E. G. Henderson, for the very handsome badges presented by the Company to the Members of this Association." Carried.

That we as dairymen feel that we are under great obligations to the Department of Agriculture for the Province of Ontario and also for the Dominion of Canada for the assistance they have rendered the Dairy Industry of Canada." Carried.

"That as an Association we wish to express our satisfaction with the work of the special officers appointed to take charge of the work regarding the adulteration of milk." Carried.

"That this Association wishes to express its gratitude to the several railroad companies for their kindness in reducing rates from all points to Belleville." Carried.

REPORT ON NOMINATING COMMITTEE.

MR. WHITTON: I am sure it affords me a great deal of pleasure to be able to be with you once more in this gathering. This is, I believe, about the thirtieth time that I have attended one of these Conventions, and I must say that I feel pleased to be with you this morning. The names of the officers, etc., of the Association as printed in this report, were then presented, and upon motion of Mr. Whitton, seconded by Senator DERBYSHIRE, the report was received and adopted.

AUDITOR'S REPORT.

MR. JOHN HYATT: It is with a great deal of pleasure that I present the Auditor's Report for the year 1909. We have discovered things that are not so pleasing, but it is no fault of the Association. A tremendous amount of work has been done by the Association for the farmers of Eastern Ontario, and this work requires financial aid; and while that aid has been very generous, the work has become much greater and requires more assistance from the Governments. This was well represented to the Minister last night, and although he gave no definite expression to us he had a smile upon his face, and we were pleased to see it.

We, the Auditors, have carefully examined the books, accounts, vouchers of the treasurer of your Association, and find the expenditure was $3,817, and receipts $3,751.19, leaving a deficit of $65.81. I am told that the Association has only received ten-twelfths of the proportion for this year owing to the change in the fiscal year.

We wish to emphasize the necessity for detail items of expenditure for those having claims against the Association. I would like specially to mention Mr. G. G. Publow and the work done by his two men, Mr. Brenton and Mr. Street. Every 'bus, every meal, every livery, and every railway fare was put down in detail, showing exactly the expenditure made, and we want to ask that this should be done by everyone belonging to the Association.

I have great pleasure in laying on the table the Report of the Auditors for 1909, and I have pleasure in moving the adoption of the Auditors' Report.

The motion was seconded by MR. KERR, and carried.

DISCUSSION UPON CHEESEMAKING.

A MEMBER: Some makers have an idea that when you are making whey butter from fast working milk that you receive more butter out of the whey than you do under ordinary conditions, and I would like to have your opinion on that point. As I understand it the casein absorbs what fat there is in the milk through

the coagulation that takes place after the rennet is added, and I would like to know how the fat is separated from the casein?

MR. PUBLOW: That is an important question. When the rennet causes the casein throughout the mass of milk to solidify or coagulate, the fat globules are imprisoned in the solidified mass, just where they are at the instant of coagulation. When the curd knife passes through the solid mass, immense numbers of the fat globules are exposed on every cut surface, and many of them are disengaged from the free surfaces of the small pieces of the curd during its manipulation, and as a result there is an unavoidable loss of about .2 per cent. of fat in the whey with normal working milk, but extra losses of fat occur when the curd in the soft stage is roughly or carelessly handled, and which is frequently the case when milk is over-ripe.

Q.—In that case you would have a large per cent. of butter from the whey?

A.—Yes, and the cheese will be of poorer quality.

Q.—You get the extra butter at the expense and quality of the cheese?

A.—Yes.

Q.—I find that if the curd is gassy, and I have to wait a long time before salting, that it takes a lot more milk to make a pound of cheese. Is the high yield due to loss of fat?

A.—No; it is more likely to be due to the loss of water.

A MEMBER: If the curd was well cooked, and yet not sufficient acid, would you rather run the whey off or leave it until it got sufficient acid in the whey?

MR. PUBLOW: If curd was sufficiently firm, I would remove the whey and mat the curd, but you will always have better cheese when the moisture and acid are in right proportions.

Q.—Does high cooking check the acid to a certain extent?

A.—Yes.

Q.—If you get curd well cooked, will it be necessary to have less acid?

A.—No, the firmer the curd is the more acid it will stand.

Q.—How often do you cut an ordinary curd?

A.—Usually three times, once with 3-8 horizontal knife and twice with 5-16 perpendicular.

Q.—Would you recommend a 1-4 knife in preference to a 5-16?

A.—I would recommend a 1-4 knife for fast working milk. It is well to have two sets of knives.

Q.—Don't you think that by improved methods of caring for the milk and the making of cheese, whey butter would be done away with?

A.—I believe that if the milk was properly cared for at the farm and skilfully handled by the cheesemaker, the loss would be so small that the making of whey butter would not be profitable.

MR. BLAKELY: I think the reports from my factory will answer this question. It takes 600 lbs. of milk to make 1 lb. of whey butter. I know for a fact that when we commenced to make every other day I separated the whey and made the butter myself, and out of 12,000 lbs. of milk (the last day we were running the cans were left open and the wind was drying the cream) I made 40 lbs. of whey butter. I think if we would cover the cans and properly cool the milk the whey business would die a natural death.

A MEMBER: Don't you think the use of agitators prevents so much of the butter fat going into the whey?

Mr. Publow: Rough handling of the soft curd crushes it, and results in an increased loss of cheese solids in the whey, and this is not so likely to occur when agitators are used.

Q.—Would you recommend that the whey be pasteurized?

A.—Yes; if you have stock to feed it to, and you are having the whey returned to the farms in the cans in which the milk was delivered to the factories. I was told that of all the animals killed this year that had tuberculosis, about 80 per cent. of them were hogs. Where do they get it? I appeal to the farmers of this country to pay more attention to the condition in which the by-products are cared for at cheese factories.

Q.—What is the average cost of pasteurizing whey?

A.—About 8 cents per ton. Of course it will vary according to conditions.

The Chairman: We are up against one of the greatest calamities that may come against a country, and that is the spreading of tuberculosis.

Q.—Will the pasteurizing of the whey overcome the fruity flavor?

Mr. Publow: In several factories where they were having trouble with fruity flavor I had them pasteurize the whey, and the trouble ceased at once.

A Member: We had that experience in our factory, and when we pasteurized the whey we got rid of the fruity flavor.

A Member: Don't you think that it is because the cans are not scalded at the time of washing that we have so many taints in the milk? I believe that very few of them are scalded, and I would like if you would tell how best to do this.

A.—I would not like to say what proportion are not scalded. I would recommend this method of preparing the cans: First, rinse with luke-warm water; then wash with warm water to which has been added some of the washing powder; then put on the cover and pour boiling water on top of the cover and let it run into the can. In this way the hot water is likely to reach all parts. Leave the hot water in for a few minutes, then empty and place the can in the sunlight. Never dry them with a cloth.

Mr. Singleton: This discussion has brought out a point that is of far-reaching importance to the dairy industry of this country. In the first place, it is absolutely necessary to have some loss in the manufacture of cheese. We cannot do it without a trifling loss, but it is possible to reduce it so low that there is a loss no greater than two pounds per ton, and we have records showing that they are getting as high as eight pounds per ton. If we get it down to two pounds it does not pay to put in a plant for manufacturing whey butter, and I would like to ask you, "What effect is it going to have on the British market?" This is where we want to do the missionary work this year. We don't want it to get abroad in the Old Country that we are doing two things in the factories of this country. In one factory they put in a plant to make butter this year, and they skimmed the whey and got good returns in butter, and the farmers liked it; and when it came the first of November the idea of some was to make butter from the whole milk, and the idea of others was something else. The result was that they made butter one day and cheese the next, and you can easily see how suspicion will arise there. The question might be asked, "Why are we doing this dual business?" When I asked this question the reason given was that the cheesemakers could not take charge of all the butter that was made every day. We must be

The Convention then adjourned.

DAIRYMEN'S ASSOCIATION OF WESTERN ONTARIO.

ANNUAL MEETING.

The Assembly Hall in the New Engineers' Building, St. Thomas, was by far the most up-to-date place in which the Western Dairymen have as yet held their meetings. Everything was new and inviting, and the accommodation was all that could be desired. There was a splendid attendance at the majority of the meetings, and the very best of order was maintained throughout.

PRESIDENT'S ADDRESS.

By J. J. Parsons, Jarvis.

As President of the Western Dairymen's Association, it affords me a great deal of pleasure to welcome you to the city of St. Thomas at our forty-third Annual Convention.

As I address you this morning, I feel that I am speaking to men of intelligence, and that it requires a man with more than the ordinary brain power, and one who has been properly prepared in the schools of this country, to make cheese and butter as it is made in this province at the present time. If you will go back a few years in the history of this industry and compare the present output with that of even ten or fifteen years ago, you will see a very wonderful improvement in the quality. The system of instruction that was put in operation in Western Ontario a few years ago has been well carried out. The men who were then at the head of the industry looked into the future and saw the need of making cheese and butter of a more uniform grade and better quality in order that we might compete with the output of other countries that are sending the product to the British Market, and these men contributed from their own private means to organize and start a course of instruction to further this work. As a result of that effort, we have to-day in operation in Western Ontario the best system of instruction that is known in any province or state, or in any country where cheese and butter is manufactured. We have to-day a system of instruction that originated from a common centre, and is so uniform that we have a most satisfactory output. Yet we do not wish to say this morning that the output in every respect because we know that there is room for improvement, and it is up to us, as the chief men engaged in the dairy industry, to see that improvement is made in the future.

Perhaps there has been no time in the history of the Association where we were required to watch more closely the welfare of the dairy industry than the present, although we have outstripped a number of the competitors that we had a few years ago. Yet there are others looming up. New Zealand, particularly, has made wonderful strides in the dairy business under the able instruction of a Canadian,

and in order to hold our own with New Zealand we will need to be bright, sharp, and wide-awake to the welfare of the industry.

There are a number of great industries in Canada. Many of them that had a very humble origin, yet have reached out to a magnitude second to that of no other country. We are proud to say that dairying is one of these industries, and it has kept pace with the progress made in other lines, and to-day it is the chief part of the agricultural industry of the Dominion, and is a source of great revenue to all those who engage in it. It is our duty to see that it increases in volume and that more wealth comes out of it. Some of you may be inclined to think that because the export of trade has fallen off somewhat, that the industry has taken a step backward; but when you come to consider the increase in the population of this Dominion and the increase in the home consumption, you will see that this is the chief reason for the falling off of the export trade, and in looking over the reports of Western Ontario for the past season, we find that there has been an increase in the amount of butter and cheese manufactured.

DIRECTORS' REPORT.

Your Directors are pleased to report that throughout the entire work of the Association for the season just closed we can justly claim progress in all the different lines of work connected with dairying.

CHEESE. The total exports of Canadian cheese from May 1st to Dec. 30th, 1909, are reported as 1,916,667 boxes, an increase over 1908 of 41,539 boxes. The value of this cheese at the average price received during 1909 (11½ cents) would be about $17,633,336.

BUTTER. The total exports of butter for the same period are reported as 39,505 packages, a decrease of 53,911 packages. The value of this butter would be about $508,025. This makes a total value of the cheese and butter exports of approximately $18,141,361.

A development of the season has been some shipment of cream by Canadian factories to the United States since the new American Tariff was put into force. These shipments of cream have been variously estimated as equal to 15,000 or 20,000 packages of butter.

Our home consumption of milk, cream, and other dairy products, together with the home trade in cheese and butter, is rapidly increasing.

QUALITY MUST BE MAINTAINED. We wish however to strongly point out that in our estimation never in the history of the Canadian cheese industry have we more reason to put forth strenuous efforts to maintain and improve the quality of our cheese than in the future. Other countries are making rapid strides in the way of production and quality, and we must see that the quality of Canadian cheese stands second to none if we intend to maintain our superior position as the foremost cheese exporting country.

WESTERN ONTARIO OUTPUT. Coming to Western Ontario we find that we produced in 1908, 17,221 tons of cheese, or about 459,227 boxes, which is 394 tons or 10,507 boxes more than in 1907. The exact returns for 1909 are not yet in, but indications point to a larger make than in 1908, as we find that out of our 211 chese factories 64 will make more cheese, 59 about the same amount, and 70 factories a little less than in 1908.

Our creamery butter output in 1909 was 10 tons greater than in 1908, so that we have no great cause for complaint in so far as the total output and the prices received in Western Ontario are concerned.

New Factories. Several new factories have been erected the past season. We again wish to point out the fallacy of continuing to build factories in sections already served by existing factories. The tendency will be, if such practice is continued, to bring the make of many existing factories down below a paying basis, and cannot be in the best interest of the industry, since it is well known that when the output of factories either from insufficient production of milk or from the fact that factories are too close together becomes too small the cost of making rapidly goes up. It is difficult to secure the best makers for such small factories, and when repairs are required it becomes almost a hardship to make these necessary repairs and keep the factory and equipment up-to-date.

We notice, however, that sections which previously, or within the past twenty years, paid very little attention to dairying are beginning to take an interest in this industry, and we think it would be quite possible to build factories in these sections which would be profitable to the patrons. It is becoming recognized more and more each year that not only are there profits to be obtained in combined dairying and hog raising, but also that there is no other system of farming that will keep up the fertility of the soil and increase the value of the land with as much profit as dairying.

Factory Improvements. In the different factories and creameries of Western Ontario all that could be reasonably expected of the proprietors or those in charge of them in the way of improvements either in adding improved machinery or other equipment, or improving the general appearance and surroundings, has been done, and a considerable amount of money has been expended in such improvements.

Pasteurization of Whey. The pasteurization of whey, which had been experimented on for the past two years, has proven where adopted this past season of great advantage, and your Directors and Instructors believe it has been a great help in overcoming some of the difficulties of previous seasons.

Instruction Work. We also find that the course of instruction given by the different Instructors in the several districts is quite uniform, and has certainly assisted in producing an even grade and better quality of cheese and butter.

Special Officer. From the past two years' experience your Directors believed it wise to continue the services of a special officer to take charge of all cases where milk was found to be adulterated, and they are pleased to report that it has been the means of reducing the number of such cases and assisting to stamp out this objectionable feature of the industry.

Board Meetings. Your Directors have held different Board Meetings during the season to consider and act on all matters pertaining to the work, and in conjunction with Directors of the Eastern Ontario Dairymen's Association, have waited upon the Minister of Agriculture for Ontario asking certain changes to be made in the Dairy Act to further improve it. The question of makers' certificates was taken up, and we believe a satisfactory arrangement has been made whereby certificates will be granted to cheese and butter makers.

Dairy Herd Competition. Your Directors believe it to be a decided advantage to the members of this Association to continue to hold a Dairy Herd Competition, the results of which will be announced later on.

Dairy Exhibit. Your Directors also continued the Dairy Exhibition in connection with this Convention, giving handsome prizes to the winners in the different

classes. We are pleased to see the continued interest taken in this Dairy Exhibition, and judging from the number of entries received this year we have the largest exhibition since this phase of the work was taken up. The Dairy Exhibit is doing a great deal to improve the quality and finish of our cheese.

Speakers for Annual Meetings. We also wish to put on record our sincere appreciation of the generous assistance given by the Ontario Department of Agriculture to this Association and its work at all times.

Upon motion of the Chairman, seconded by Mr. Scott, the report was received and adopted.

FINANCIAL STATEMENT.

The financial statement was then read, and upon motion of Mr. Scott, seconded by Mr. Dempsey, it was received and adopted.

REPORT OF THE COMMITTEE ON THE DAIRY HERD COMPETITION.

By Frank Herns, London.

This competition was conducted practically on the same lines as last year and any of you who entered into the competition have a set of the rules.

Your Directors decided to again carry on a Dairy Herd Competition donating $100 in cash prizes to patrons of cheese factories and creameries in Western Ontario. Ryrie Bros. again very kindly donated a Silver and Bronze Medal. The prizes offered and rules of competition were as follows:—

Two Diamond Hall medals (enclosed in handsome cases). Donated by Ryrie Bros., Toronto.

$100.00 in cash prizes donated by the Dairymen's Association of Western Ontario.

To the patrons of cheese factories who furnish the first, second, third, fourth and fifth largest amount of milk per cow to any cheese factory in Western Ontario from May 1st to Oct. 31st, 1909.

1st. A silver medal and $15.00 in cash; 2nd, $15.00 in cash; 3rd, $10.00 in cash; 4th, $6.00 in cash; 5th, $4.00 in cash.

To the patrons of creameries who furnish the first, second, third, fourth and fifth largest amount of butter fat per cow to any creamery in Western Ontario from May 1st to Oct. 31st, 1909.

1st. A bronze medal and $15.00 in cash; 2nd, $15.00 in cash; 3rd, $10.00 in cash; 4th, $6.00 in cash; 5th, $4.00 in cash.

Rules of Dairy Herd Competition.

1st. No herd of fewer than eight cows will be allowed to compete.

2nd. Figures must be taken from the cheese factory or creamery books, and the number of cows and the total and average amounts of milk or butter-fat must be certified to by the cheese or buttermaker, and the secretary of the cheese factory or creamery.

3rd. The average amount of milk or butter-fat per cow must be calculated on the basis of the total number of cows from which milk or cream is sent to the factory during the season of six months, May 1st to October 31st, 1909.

4th. No substitution of one cow for another will be allowed.

NOTE.

Example 1.—If the patron begins to send milk or cream to the factory on 1st o May from say eight cows and continues to send to the 31st of October from the sam herd he is eligible. Larger herds the same.

Example 2.—If the patron begins to send milk or cream to the factory on 1st o May with say only seven cows in milk and in June, or at any other time, another co freshens, and in July, or at any other time, another cow freshens, making in all nin cows, the patron is not barred from competing, provided the total number of cows (9 is used for dividing the total milk or butter-fat to find the average amount of milk o butter-fat per cow for the season. Larger herds the same.

Example 3.—If the patron begins to send milk or cream to the factory on May 1s with say eight cows, and in June or any other time in the season, for some cause, on cow drops out of the herd, the patron is not barred from competing, provided the tot number of cows (8) is used for dividing the total milk or butter-fat to find averag amount of milk or butter-fat per cow for season. Larger herds the same.

Example 4.—If the patron begins to send milk or cream to the factory on May 1s with say eight cows in the herd and sometime during the season, for some cause one o more cows drop out of the herd, the patron will not be allowed to substitute a new milc or any other cow in order to keep up the milk from the herd. Larger herds the same.

CLASS I.—CHEESE FACTORY PATRONS.

1st. John W. Cornish, Sprucedale Farm, Harrietsville, Ont., 50 acres in farm, Holstein grade cows, 59,727 total lbs. of milk, 6,636 lbs. of milk per cow, $350.96, tot money, $61.22 money per cow, 1,194.5 lbs. of milk produced per acre.

2. John Vanslyke, Dunboyne, Ont., 100 acres in farm, 11 Holstein grade cows, 71,82 total pounds of milk, 6,529 lbs. of milk per cow, $683.56 total money, $62.14 money pe cow, 718.28 lbs. milk produced per acre.

3rd. Mason Bros., The Maples, Tyrell, Ont., 280 acres in farm, 21 Holstein and Ho stein grade cows, 132,127 total lbs. of milk, 6,291.76 lbs. of milk per cow, $1,098.49 tot money, $52.31 money per cow, 471.8 lbs. of milk produced per acre.

4th. A. E. Hulet, Evergreen Stock Farm, Norwich, Ont., 120 acres in farm, 8 pur bred Holstein cows, 48,325 total lbs. of milk, 6,054.25 lbs of milk per cow, $420.72 tot money, $54.15 money per cow, 402.7 lbs. of milk produced per acre.

CLASS II.—CREAMERY PATRONS.

1st. R. M. Bowie, Maple Lane, Beachville, Ont., 50 acres in farm, 11 grade Holstei cows, 2,472.4 total lbs. of butter fat, 224.7 lbs. of butter-fat per cow, $706.08 total mone $64.19 money per cow, 49.4 lbs. of butter-fat produced per acre.

2nd. E. W. Lick, Beachville, Ont., 100 acres in farm, 12 Holstein grade cows, 2,546 total lbs. of butter-fat, 195.8 lbs. of butter-fat per cow, $696.50 total money, $53.58 mone per cow, 25.4 lbs of butter-fat produced per acre.

3rd. William Hutchison, Pleasant Grove, Princeton, Ont., 200 acres in farm, 21 Du ham cows, 3,738 total lbs. butter-fat, 178 lbs. of butter-fat per cow, $983.08 total mone $46.81 money per cow, 18.7 lbs. of butter-fat produced per acre.

4th. Courtney Carr, Ingleside, Beachville, Ont., 100 acres in farm, 20 Ayshire an Jersey grade cows, 3,120.7 total lbs. of butter-fat, 156 lbs. of butter-fat per cow, $860.5 total money, $43.10 money per cow, 31.2 lbs. of butter-fat produced per acre.

5th. George Bouchier, Echo Farm, Washington, Ont., 25 acres in farm, 9 Jersey grad cows, 1,184 total lbs. of butter-fat, 131.5 lbs of butter-fat per cow, $261.62 total mone $29.06 money per cow, 47.3 lbs. of butter-fat produced per acre.

6th. Albert Goettling, Pine Grove, Baden, Ont., 100 acres in farm, 10 Holstein an Jersey grade cows, 984 total lbs. of butter-fat, 98.4 lbs. of butter-fat per cow, $213.4 total money, $21.34 money per cow, 9.84 lbs. of butter-fat per acre.

THE CHAIRMAN: I am sure you have listened with a great deal of pleasure t this report of the Dairy Herds Competition. This part of the Association's wor is only of a few years' standing. You will agree with me that in order to exc or to improve in any line of work there must be some incentive. The Weste Dairymen of Ontario felt the need of putting forth some special effort in order t induce the producers of milk to increase the amount of milk produced per cow, an they thought this scheme was the most feasible. I am pleased to see the kee

competition that has taken place with regard to this. We have one of the winners with us to-day. Mason Brothers stood 5th in the competition last year, and they stand 3rd this year. If Mr. Cornish is present, I take pleasure in asking him to come forward and say a few words.

J. W. Cornish, Sprucedale Farm, Harrietsville: I am sure it gives me much pleasure to be here at another Dairymen's Association. I am also pleased to be a winner in this Dairy Herd Competition for 1908 and 1909.

I am not a public speaker, but I will try and answer any questions you may ask me. I had no intention of entering the competition this year until about the first of December, when I saw an article in the *Farmers' Advocate* saying that there was not going to be a sufficient number of entries to take up the prizes, and I concluded to enter my herd in order to make up the number, and I have won out. I started with six cows and raised two calves, and after the 20th of May I had three more cows, which made nine, and I can give you the figures for each month.

Q.—What was your method of feeding during the summer?

A.—I always fed a little bit of meal of some kind up till they got green food, then oat chop, middlings or bran. I never fed more than two quarts at a time, that is when they got out on the grass, and when the grass was good, one quart. I always fed them at the milking hour.

Q.—Do you think it is good to feed meal when they are on good pasture?

A.—If you want to see how much they are going to give that is about the best way to get at it.

Q.—Did you keep any record of how much grain you fed during the six months?

A.—No, I did not.

Q.—I would like you to figure that out another year.

A.—I may not try it another year.

Q.—Did you feed any grain at all when on the pasture?

A.—Yes.

Q.—Did you feed the meal also?

A.—Yes, I never quit the meal. Of course, it got very dry in our part of the country, and I suppose it did in other places. We sowed from about half an acre to three-quarters of an acre of Hungarian grass and as soon as it started to head up I commenced feeding it until the corn came and then I fed corn.

Q.—Do you know what the cows averaged for the season?

A.—Not exactly. I sold quite a few of the calves. The cows averaged $91 apiece, and I have the two calves I am raising.

Q.—The total pounds of milk per cow?

A.—I do not know. I did not take time to figure that out.

Q.—Was the $91 from milk and calves?

A.—Yes, that is from the first of April to the first of January, $91 per cow.

Q.—How many calves did you sell?

A.—I sold six or seven. I sold them for $5 apiece this year; they were cheap.

Q.—How old were the calves??

A.—From three days to a week old.

Q.—Do not you think you are wasting money feeding chop?

A.—Green feed is the cheapest, there is no doubt about that; but if you give them a little chop it will keep them in better condition.

Q.—Did you use a silo?

A.—Yes, but not much for summer feed. I only had enough left over for two weeks.

Q.—What stage of the growth did you start to feed the corn?

A.—As soon as it commenced to ear.

Q.—Not before?

A.—No. I do not think it is much good for milk till there are ears on it.

Q.—Did you keep on feeding ensilage with the grain?

A.—No, not in the summer season; I did not have enough to do it. I just fed it for two weeks. I would have fed it if I had had it.

Q.—Do you think the ensilage would be equal to the Hungarian grass?

A.—I think it is with a little bit of meal added. I do not think there is anything that will beat the Hungarian grass as long as it will last. Last season it got pretty dry.

Q.—About what time did you sow the Hungarian?

A.—About the third of June, a little later than that this year because it was wet during the first part of the season.

Q.—Is Hungarian harder on the land than a corn crop?

A.—It is always said to be, but I sowed it on the same land three years in succession, and it did not hurt it very much.

Q.—What did you fertilize that land with?

A.—Manure.

Q.—Did you ever try feeding alfalfa?

A.—No. On a fifty acre farm there is not much chance to grow everything.

THE CHAIRMAN: It affords me a great deal of pleasure this afternoon to introduce Mr. N. P. Hull, of Michigan. He is Master of the Grange in the State of Michigan, and one of the directors of dairying, and President of what is called the American Dairy Farmers' Association. You will understand from this introduction that Mr. Hull is a man of considerable experience. He has been attending Association meetings in different parts of the United States and he comes to us to-day to favor us with an address on "The Value of Cow Testing Associations," which is a very important subject and one that you will all undoubtedly be interested in. It is a necessary feature of the work if you want to increase the production of the cow. Without any further remarks I will now call upon Mr. Hull to address you.

THE VALUE OF COW TESTING ASSOCIATIONS.

By N. P. HULL, of DIMONDALE, MICH., U.S.

I assure you that it is with a great deal of pleasure that I came across from Michigan to meet with the dairymen of Canada. It is the first time I have had the pleasure of addressing a good Canadian audience. However I do not feel so far from home or so out of place. All along the border line of our state I find that one-half to two-thirds there are men who have drifted across the border from Canada, and some of the very best farmers and dairymen in Michigan originally came from Canada; and I concluded that where they send away so many good men, there must be a plentiful supply of good men left. (Laughter and applause).

After all I have heard about the intelligence of your Canadian farmers, I was pleased to have an invitation to come and address you. I want to extend to you an

invitation to attend the next American Dairy Farmers' Association meeting, which will probably be held in Milwaukee in connection with the National Dairy Show next October. This year, when the farmers were called together over there, we found about two-thirds as many people present as there are here to-day, and the next day when the National Creamery Butter Makers' Association met, there were three times as many in the hall. There are many and many times over, as many dairymen as there are creamery and butter makers, and the man with the cow needs information and instruction and the enthusiasm that comes from these meetings; yet we only had one-third as many dairy farmers present as there were creamery men.

I happened to be elected president of that Association, and it is my hope and desire that when the next American Dairy Farmers' Association meets that it will have as many in proportion to the whole number of dairymen present, as there are of the National Creamery and Butter Makers. It was thought first that we would call this the National Dairy Farmers' Association, but someone called our attention to the fact that here were the Canadian provinces, and that we needed the inspiration and enthusiasm and the information that they possessed, and we made that Association broad enough so that our Canadian dairy farmers could come in and join hands with us in uplifting this great cause; so instead of calling it the National Dairy Farmers' Association, we called it the American, and it is just as much an association of the Canadian farmer to-day as it is of the farmers of the States.

Your President has kindly consented to appoint ten delegates from this Association to meet with the American Dairy Farmers' Association, and I hope to see these delegates present.

What I know about dairying and the dairy business was not learned at the Agricultural College in Michigan nor in any Dairy School. I learned it in my cow-stable, rubbing up against the dairy proposition itself, feeding the cows and milking them, and using a lead pencil to make notes, so as to find out where the profit was, and how to get at it. You who have been keeping track of the cost of production have been attending the same school, and if you have watched results as closely, your information is just exactly as valuable as mine. I do not want to make an assertion that is not true. If I know anything about the business, I want to impart that information this afternoon, and you can ask me questions any time you have a mind to; and if I make a statement that you do not believe is true, ask me about it and I will prove it to you. At any rate we can talk the matter over.

I am going to say to you that you and I who are engaged in dairying are putting our lives into the proposition, and what we shall gather in the way of profits measures the value of that part of our time that we put into it. It seems to me that the man who is putting part of his life into a proposition ought to feel that that life of his is of sufficient value—that it will pay him in such a way as he will get the most possible out of it. I am sure you will all agree with me that want of knowledge is what is hampering the dairy farmer who puts his life into feeding and milking those cows, and taking care of the product, from getting the profit he ought to get. Surely the price of dairy products is high enough. You will find every year that the man on the dairy farm works more hours than he ought to work, and you will find the good woman works harder than any woman ought to have to work, and you will find the boys and girls working harder than they ought to; and when the end of the year comes, that man is no better off than he was at the beginning, and even after a decade of years he has nothing to show for his

hard labor except the bare fact of having existed. I say to you, my friends, that it is too bad a man should do that. Then again, you will find other men who are not making 25 or 50 per cent. of what it is possible to make.

Now we are putting our lives into it, and should not we all join hands together and try to raise the plane of American dairying, so that we will get more for the time we put in? I ask you again, "What is hampering the American dairying interests?"

There are two things. The first thing is a poor cow—a cow that a man has to feed, milk, and care for, and that does not show any profit, or a mighty small percentage of profit. I have travelled across this Canadian province, and although this is my first stop, I am sure I can say that your cows are not very much better than our cows over in Michigan. I am sure I can say that there is many a man to-day who is milking cows, and trying to make dairy cows of what God Almighty made for beef cows. A man is putting in his time with that poor piece of dairy machinery and is not getting results out of it that he ought to get. Then again, there are too many good cows in Canada, the same as in the States, that are not paying their owners the profit they ought to pay, because they never had a decent chance—because their owners never cared for them in such a way as to make it possible for them to make the profit they ought to make. As I said before, there are two things hampering the dairy business of to-day, poor cows and lack of information as to how to take care of good cows, and then beyond that is lack of inspiration to do as well as we know how to do. If I can convince the Canadian dairyman that he must adopt a policy that will weed out and get rid of these poor cows and put good cows in their places; if I can say something to give these Canadian dairymen the information that they ought to have about their business so that they will know how to go at it; if I can give them inspiration and an incentive to go home to their dairy farms and work them to the best possible advantage; then I have come over here for some purpose, and it will have paid the people of Ontario to have sent for me to come. I want to do a little something along that line if I can. What you lack more than any other one thing is inspiration and the incentive to do as well as you know.

I hold that there are three kinds of cows in America; one kind of cow takes her food, digests and assimilates it and because of her inborn temperament, the law of her nature, she takes that digestive food and turns it into flesh; she puts it on her back. True it is that she furnishes enough milk to take care of her young. It does not make any difference whether her name is Shorthorn, Hereford, or Galloway, if the law of her nature is such that she converts it into flesh, she is a beef animal, and you had better make beef of her.

There is another kind of cow that takes her food and digests it, and because of her inbred disposition, or the law of her nature, she takes that digestive food and instead of getting flesh she converts it into milk, and puts it into the milk-pail. That cow is a dairy cow, and it does not make any difference whether her name is Holstein, Ayrshire, Jersey or Shorthorn, if she is of that temperament, and if the law of her nature inherited from a long line of ancestors prompts her to put it into the milk-pail, she is a dairy cow; and I want to say to you, my Canadian farmer friends, that you had better keep that kind of cow, because she will do you more good than any animal that ever walked on four legs.

Then there is another kind of cow that takes her food, digests and assimilates it, and God only knows what she does with it. She neither makes beef or milk of it, and she is of no value to anyone, under the circumstances.

Q.—What would you do with that last sort of cow?

A.—I am going to tell you right now. This is not a story. These are facts. The Governor of Michigan is a cheese man. He has fourteen factories, and when he was Secretary of the State, I went with him to every cheese factory that he had, and I talked to the patrons of his cheese factories. At the annual meetings, I gave them my idea of selecting food and caring for cows. He asked me to come back again, and he said to me, "Surely there must be something that will impress some of these facts upon these dairymen." We thought of a scheme and the next morning, after the Governor had made his report at the factory, he asked each one of his patrons how many cows they delivered milk from the year before. Mr. Brown said he had twelve, Mr. Jones had fourteen, and so on. He introduced me, and I went over this matter, how to select cows and how to take care of them, and when I got through, the Governor came back and made his report, and he said the lowest man delivered 2,900 pounds of milk per cow, and the highest man delivered 8,700 pounds of milk, and these two men lived just exactly one mile and a quarter apart. A man who sat to the left dropped his head. He was a bright looking fellow, too. Then he looked over at the Governor, and said, "Fred, am I the man that delivered only 2,900 pounds of milk per cow?" The Governor said, "I did not intend to say who it was, but as you have asked me, you are the man." That fellow looked right over at me, and he said, "If you had cows that would only give 2,900 pounds of milk, what would you do?" I said, "My friend, if I had given these cows a decent chance to give milk, if I had fed them and cared for them in a way to enable them to give milk, I would sell them, and do it quick." He came right back at me with this proposition, "Would you sell them to your neighbor?" I thought just a moment, and I said, "I will tell you what to do. If you have a neighbor that you do not like, if he is a mean, despicable man, and you want to get even with him, go over and say to him, "Neighbor, if you will agree to take care of five of my cows and keep them for five years, I will give them to you And if you can agree to get that man to take care of these cows for five years, give them to him, but for goodness sake don't sell them to him, that is doing something too mean altogether." Then I said, "Next summer, when you go out on your back porch and watch him sweat in the hay field, harvest field, and corn field to get feed for these brutes, you can feel tickled because you have given him animals that will take the hard-earned dollars out of his pocket." There is a moral that goes with this: If it is a mean trick to give another man such cows as that and make him promise to keep them, a man is doing a mean trick to himself and his family if he keeps them, and there are a lot of men in this Province of Ontario that are doing just exactly that same thing. Now about getting rid of them. I want to show you the necessity of this thing. Two young men just starting life were dairying over in my section of the country. They had small farms and kept about sixteen cows each. They were making butter. One got a pair of scales, and a Babcock tester so as to know what the cows were doing. He weighed the feed and weighed the milk. I said to the other young man, "Why don't you do that?" His characteristic reply was, "I have not got the time to monkey with it. If I feed these cows and milk them and take care of them, it keeps me busy." What were the results? Three years afterwards, one young man was getting 250 lbs. of butter per cow, and the other young man was getting only 200 pounds. You know the one which was getting 250 pounds? It was the one that was weeding out the poor cows. It took about 150 pounds of butter to pay for the cost of keeping the cows, and the outcome was that one man was getting 100 pounds of butter profit and

the other 50; and the sad thing about it was that he had to come to the time when he had to monkey away another year. He must plant his corn, harvest his crops, and feed his cows for a whole year and got only 50 pounds of butter profit; and it took him two years to make as much money as the other one made in one. I want to say to you that a man in the dairy business makes a big mistake when he thinks he cannot afford to take time enough to know his own business. Dairymen as a class are putting in two years to accomplish what they could do just as well in one year. Is there any man here who does not believe that? Is there any man here who will get up and argue with me on that point? If we use the methods that we should to get better cows, and if we cared for them as we ought to, we could make as much profit in one year as we are making in two. How are you going at it to do it? In support of this contention, we Americans claim we are the cream of the world. We point out to our friends across the water the fact that 300 years ago there was just a little band of farmers here, and in the 300 years that have elapsed since then, we have planted and sowed until this year we produced over $8,000,000,000 worth of farm crops, and we are producing about 145 pounds of butter per cow. If you go across to the little country of Denmark, they are producing about 240 pounds of butter per cow, and in Holland they are producing 250 pounds per cow. In spite of our boast of intelligence and in spite of our boast of our wonderful hustle and energy, we have got to hold up our hands and say that the farmer in little Holland is beating us and beating us a long way. Now, my friends, if we are interested in improvements, we must get rid of these poor cows. I stood in a barn over across the border, the owner of which was a Canadian, and he said to me: "Mr. Hull, how much difference do you suppose there was in the profit of these two cows?" I said, "I cannot tell, I do not believe the man lives who can look at two cows and tell the difference." "Well," he says, "I know, because I have kept track of it. I know just what these cows have done in the last year. That right hand cow made me just ten times the profit that the left hand cow did." Now just stop and think! Supposing my friend, Mr. Parsons, and myself were dairying on farms side by side, and he had cows like the right hand cow, and I had cows like the left hand cow. At the end of the year, he would have ten times as much cash profit as I would have. That means that I must sow and reap and milk for nine years more before I will have as much profit as he would get in one year. For the last ten years that I have been going up and down the State of Michigan, I have been advocating that dairymen should buy scales and a Babcock tester, and know their business. Many men have said, "That is right," but in spite of that, how many of them have done it and why have they not? Because they do not believe it would pay to do it? They would all like to do it, but when the time comes to test the milk, it is time to put in the corn, and then they are busy, and they say, "I will wait till to-morrow"; and then they will put it off again, and the result is that not 1 per cent. of them are doing it.

A young man came across the water from Denmark, and he started as a creamery butter maker, and he finally became a member of the Instruction Department in Michigan. He said: "Over in Denmark the farmers could not pay taxes if they raised beef. They had to go into dairying, and they found that a large percentage of their cows were poor dairy cows and their average over there twenty years ago was only 112 or 114 pounds of butter per year. The Government

took a hand in it, and they subsidized Dairy Testing Associations, which is simply a co-operative method of doing this work. The men come together and they agree to pay $1 per cow, and to have a man whose business it is to visit the herds once each month, weigh the feed, make a computation of the value of that feed, weigh the milk that each cow produced and test it and at the end of the year they furnish the man with a sheet for every cow, and that sheet would tell just when that cow freshened, what it cost to feed her each month, and what she gave per day, the amount she produced in butter fat, and the value of it and the value of the skim milk."

Is there any man here who thinks that information with regard to his cow would not be of value to him? Is there any man here who thinks that information would not be worth $1 per cow? It would be worth it for the purpose of building better dairy herds and saving heifer calves from the best cows. They now have from 1,200 to 1,400 of these Dairy Associations in Denmark, and starting twenty years ago with an average production of 114 pounds they are now up to 214;—they have almost doubled their production per cow. These 114 pound cows were a losing venture, and the 214 pound cows make it possible for these men to succeed.

We started our first Dairy Testing Association under the tutelage of this man Able, who came from Denmark. We induced the men in one section to come together and start this work. This was four years ago, and what are the results? At that time there was not a pure bred dairy sire in that whole community, and to-day there are twenty-six pure bred dairy sires in that organization, and nearly every farmer is taking up testing. This year it will be necessary to have two organizations in that district. I was up there this year, and visited many of the men, and I never saw such a change in a dairy community in my life. I never saw so many new barns and so many improved barns, so many cement floors, and such a large improvement all along the line of dairying as I saw there. Their enthusiasm has increased just by the bare fact of their coming together under the influence of this young man, and they talk to each other about their herds and they all get inspiration from the very fact that they are working together. I noticed at this meeting that a gentleman was asked the question what it cost to keep his cows, and he said he did not know. Can any of you tell me what it cost you last year to keep your cows, if so raise your hands. There is just one man. Supposing I told you a merchant did not know the cost of the goods he was selling you; you would know at once he would not make a success of his business. I tell you, my friends, we are interested in the profit in the business, and the profit is the difference between the cost of production and what we get for it. It is just as essential that a man should know and study the cost of production as it is that he should know his selling price. Some one says, "Does it pay to feed meal to the cows in the summer time?" Go into a Testing Association and find whether it does or not. Supposing you can get along without feeding grain, that is just what you want to know. If you can make more profit out of your cows without feeding grain then you do not want to feed it. The thing you are after is the net profit per cow. I was over in one of our counties on the border line talking, and a fellow said to me after the meeting: "I heard you talk dairying five years ago first, and I had never fed very much grain; and I made up my mind that if I could make more profit feeding grain I would go home and buy some

of these concentrates, these feeds that carry high protein contents, and I would feed my cows with it. I fed my cows better that winter than I ever fed them before, and I made more profit; the next year I fed them better still, and it has actually taken me five years to get confidence so that I would dare to invest money in dairy feeds. He added, "Now I know the better I feed the cows the better they pay me," and one of the great values of a Cow Testing Association is *to know.* Now you will go home and you are not quite sure that under your conditions it will pay you to do it, and you have not faith enough to feed the cow what she ought to have, and you will never get that faith by listening to other people's experience. The only way is to test for yourself and be satisfied. The result of forming these associations in Michigan is that we have much better dairying conditions. I have just come from a visit to Vermont. In an Association over there the five best cows yielded a profit of $90.72, while the poorest cow yielded a loss of $15.36, and the problem I want figured out is this: "How many of these poor cows must a man have to make as much profit as he would make from one good cow?" (Laughter). That is a hard proposition to figure up.

Over in Vermont we organized a Testing Association. I went to a market gardener and he said, "I have only five cows, and I am going out of the business because there is no profit in it; I am going to do more market gardening and less dairying. I believe Testing Associations are right, and if you cannot get enough men come back to me and I will go in." He added, "I want to sell my cows and I will take $35 for any cow; they may come and take their choice." He went into the Testing Association, however, and for the first year's results he had a profit from one cow of over $52. Another cow paid $7 profit. A neighbor came over to him and he says, "Mr. Brown, I understood that you said you would take $35 for any cow you had." He replied, "I did a year ago." "Well," he says, "I will tell you what I will do, I will give you $75 for that cow that made $52." But Brown answered, "I do not want to sell her; I am going to buy more cows, for there is more money in it than I supposed." Then the other man said, "I will tell you what I will do. You can take your choice of any three cows in my herd for that cow." But he said, "I would rather feed and milk that one cow than feed three of your cows to get the same profit." I have seen a lot of men who said, "I milk my own cows, and I know which is my best cow"; and I have heard some of their bluff called, and I have seen them tried out, and I have never seen a man yet that could guess anywhere near which was the best cow.

I am selling on the flat rate, and there never was a bigger swindle perpetrated in God's world than selling at that rate. There is just as much sense in paying the same price for 4½ per cent. milk and 3½ per cent. milk for cheese purposes or any other purpose as there is in paying the same price for shrunken wheat as you pay for plump wheat. I am selling on the flat rate, and I keep cows that do not give too rich milk, and the man that puts in 4 per cent. milk for the same price with me on 2 per cent. or 3 per cent. milk is getting buncoed. I have two cows standing side by side, giving the same amount of milk within a few pounds, one testing 2.8 and the other 4.4 per cent., and if I were selling on the flat basis I could tell by the looks of these cows when one would be losing money for me and the other making a profit. Why don't you organize Testing Associations, and know what your cows are doing? One man said, "Supposing I find out they are all poor, what would I do?" The University of Illinois started to get some data along

this line, and they agreed to take so many farms and do the testing. They went to one man and asked him if he would let them test his cows, and he said, "Supposing they are all poor, what will I have to feed, my corn stalks and my other feed?" If you are afraid of the dollar per cow that you may have to pay there is no hope for you in this world nor in the world to come, because no man ever made a bigger mistake in this world than the failure to make a little investment in order that he might be a little more successful next year than he was the year before. How do you expect that the children that come after you are going to be better dairymen, or to reap a greater reward for their toil, unless you adopt some system to get better conditions. No man ever made a better investment in time or money. If we keep the heifer calves from the best cows and make cows of them, we are sure to have better cows than you have now. If we keep the heifer calves from the poor cows, how can we expect to come to a better state in the future? I have to thank you for your giving me such good attention. (Applause.)

COMMERCIAL FEEDING STUFFS ACT.

By Robt. Harcourt, O.A.C., Guelph.

During the last session of the Dominion Parliament, an Act known as "An Act Respecting Commercial Feeding Stuffs" was passed, which became operative on the first of January last. It is important that dairymen, who are the chief buyers of the mill by-products referred to in the Act, should make themselves familiar with its terms, in order that they make intelligent use of the aid it affords them.

The need for such an Act has been felt for some years. This is because an ever-increasing number of comparatively new and untried feeding stuffs, principally mill by-products, have been offered for sale. Most of these are valuable additions to our list of cattle feeds, and are the residues from the manufacture of some specific product from the crops of the farm. They contain all the food constituents commonly found in fodders, roots, grains, etc., but in different proportions. Most of these mill by-products, including linseed meal, dried brewer's grains, gluten meal, gluten feed, and the various kinds of bran, middlings, etc., are very much richer in protein than the original seeds or grains, because the substance extracted from them consists of fat, in the case of the first two, and of starch or of products rich in starch, in the case of the others, thus proportionately increasing the protein in the residues. For this reason, all of these by-products have been found to serve an excellent purpose in building up rations; they are generally palatable and healthful, and, if judiciously used, do not contribute any undesirable qualities to the products, beef or milk. Besides, they possess the further advantage in that, in many cases, the cost of the ration is reduced by their use. Their intelligent purchase and economical use, however, require that the purchaser shall possess a definite knowledge of their composition.

The following table gives the composition of the more common grains and some of the by-products derived from them which are now on the market:

	Nutritive ratio.	Moisture.	Crude Protein.	Crude Fat.	N.F. Extract.	Crude Fibre.	Ash.
Flax Seed	*1-4.7	5.0	22.6	31.3	29.3	4.9	6.9
Linseed Meal	1-2.3	9.0	30.4	7.1	37.0	10.6	5.9
Barley	1-9.0	14.3	10.6	2.1	66.0	4.5	2.5
Barley Dust	1-4.6	10.6	14.0	2.2	55.9	13.9	3.4
Brewer's grains	1-3.3	76.2	5.1	1 7	10.7	5.1	1.2
" " (dried)	1-3.3	9.5	20.6	7.0	42.3	15.9	4.7
Corn	1-9.7	11.0	10.4	5.1	70.0	2.0	1.5
Gluten Meal	1-2.2	6.8	34.9	6.9	49.6	1.1	.7
Gluten Meal	1-5.0	5.6	17.7	7.4	62.3	6.2	.8
Corn Bran	1-11.4	6.0	8.6	2.0	64.9	16.3	2.2
Wheat	1-6.7	13.4	12.0	1.9	69.0	1.9	1.8
Wheat Bran	1-4.6	10.4	15.0	3.7	57.1	8.7	5.1
Wheat Middlings	1-4.7	10.1	15.5	3 9	62.5	4.3	3.7
Oats	1-6.5	13.0	11.3	5.4	57.3	10.0	3.0
Oat Hulls	1-15	8.7	7.6	0.5	48 5	28.6	6.1
" Hulls	1-85	5.3	1.5	1.0	51.1	35.5	5.6
Peas	1-2.8	14.0	22.5	1.6	53.7	5.4	2.8
Pea Bran	1-8.7	7.5	10.0	1.4	36.1	42.1	2 9
Alfalfa Hay	1-4.8	8.4	14.3	2.2	42.7	25.0	7.4
Clover Hay	1-5.3	15.3	12.3	3.3	38.1	24.8	6.2
Timothy	1-14.7	13.2	5.9	2.5	45.0	29.0	4.4
Oat Straw	1-31.5	14.5	4.0	2.0	37.0	36.8	5.7
Corn Silage	1-15.6	79.1	1.7	.8	11.1	6.0	1.4
Turnips	1-10.6	91.5	1.0	.2	5.7	0.9	0.7
Mangels	1-12.8	87.0	1.0	.1	10.2	0.8	0.9

*Figured from total food constituents.

Notice how the extraction of fat from flax seed leaves the by-product, linseed meal, or oil cake, richer in all the other constituents, giving us a food exceptionally rich in the muscle forming substance, known as protein.

In the case of the brewer's grains, the malting process to which the barley has been submitted has changed starch into sugar, which in turn has been separated from the malted mixture and, consequently, the product is richer in protein than the original barley. Corn is a starchy grain and is used to prepare starch for laundry and culinary purposes, and to prepare glucose and corn syrup. Corn is also comparatively rich in fat, and sometimes this is separated from the germ giving us corn oil with corn oil-cake as a by-product. Thus, from corn we have four by-products—gluten meal, a material which contains a very large amount of protein; corn bran, the outer covering of the corn, a comparatively poor food product; corn oil-cake, germ of the grain minus the greater part of the fat, but rich in protein; the gluten feed, which is a mixture of gluten meal, corn bran and corn oil-cake, or all the by-products of corn left in one feed.

The making of flour from wheat leaves a by-product largely composed of the outer coverings of the grain, and, consequently, more fibrous, and containing more protein, because this constituent is found in largest quantities immediately under the bran layers. Oat hulls are comparatively easily and completely separated from

the oat kernel and form a product which has a very low food value. Further, it is evident that there is considerable variation in the composition of this product.

Another thing that has added to the difficulties of intelligently purchasing these products is the tendency of the manufacturers to mix various by-products and offer them for sale under a trade name that gives no clue to their probable nutritive value. These mixtures may be, and frequently are, very desirable feeds, but the buyer cannot form a correct idea of their value unless he knows the amount of protein, fat and carbohydrates they contain, or has proved their value by feeding trials.

There is also a tendency in some cases to mix low-grade by-products with those the farmer is familiar with, as, for example, oat hulls with wheat bran. With this condition of affairs, it is evident that the purchaser of these valuable by-products cannot form a correct idea of the probable composition or value of feeds from the name they bear. The object of the Commercial Feeding Stuffs Act is to aid the farmer in the intelligent purchase of these feeds.

This Act provides that no commercial feeding stuff can be legally offered for sale in the Dominion of Canada until it is registered with the Inland Revenue Department. It is then given a registration number, which, together with the guaranteed per cent. of protein, fat and fibre, must be affixed by the manufacturer, or agent, to every package of commercial feeding stuff sold or offered for sale. The statement required is as follows:

1. Name of Brand.
2. Registration Number.
3. Name and address of Manufacturer.
4. Guaranteed analysis.

This may be either printed on the sack, or a printed tag bearing the required information may be attached to the package.

Experience has proved to the Department that the name of the brand on a material is not enough for identification purposes, for more than one feed may be sold under the same name. Consequently, it was thought advisable to give each feed a registration number, which number must always appear on the goods, and, of course, could only stand for one feed. The guaranteed analysis does not call for the full percentage composition of the feed, but for the minimum percentage of protein and fat, and the maximum percentage of fibre. A knowledge of the amount of the latter constituent is important as this material is very indigestible and its presence decreases the digestibility of the other constituents of the feed.

The Act defines a commercial feeding stuff as follows:

"Commercial feeding stuff," "feeding stuff," and "feed," mean any article offered for sale for the feeding of domestic animals, and feeds claimed to possess medicinal as well as nutritive properties, excepting only hay and straw, roots, the whole seeds or the mixed or unmixed meals made directly from the entire grains of wheat, rye, barley, oats, Indian corn, buckwheat or flax seed; wet brewers' grains; the bran or middlings from either wheat, rye, oats, peas or buckwheat sold separately and not mixed with other substances."

It will be noticed that whole seeds or the mixed or unmixed meals made directly from certain grains are exempted, as are also bran and middlings from either wheat, rye, oats, peas or buckwheat as long as these are sold separately and not mixed with one another or with other substances. There was no desire on the part of the framers of the Act to in any way hamper trade in these commercial products. Therefore, these common, well-known products that are sold in large quantities

locally were not included in the Act. It is recognized, however, that fraud has been practised in the mixing of oat hulls with wheat bran, and that meal from mixed grains may be adulterated. To check this without putting the manufacturers to the inconvenience and expense of stamping the composition of the package, it was decided to deal with the adulteration of these products under Section 26 of the Adulteration Act. With the object of determining a fair standard composition, the Chemist of the Inland Revenue Department collected and analyzed 541 samples of bran, middlings, and mixed feed or "chop," or Moulée.

The results of these analyses are given in Bulletin No. 191 of the Inland Revenue Department.

To show the variation in composition found in these products, I quote the following figures from the Bulletin, which give the extreme and main results of the analyses:

	Maximum.	Minimum.	Mean.
Bran: 148 samples analyzed.			
Moisture	13.37	7.90	10.69
Fat	9.52	1.42	3.92
Proteids	17.56	11.81	14.67
Crude Fibre	13.20	3 96	9.26
Ash	7.16	3.16	5.53
Carbohydrates	64.25	50.06	56.01
Shorts or Middlings: 258 samples analyzed.			
Moisture	13.56	6.45	10.54
Fat	6.88	0.95	4.04
Proteids	18.93	10.00	15 25
Crude Fibre	12.15	0.22	5 63
Ash	5.74	0.88	3.63
Carbohydrates	74.18	51.04	60.55
Chop-feeds: 135 samples analyzed.			
Moisture	13.92	3.05	10.38
Fat	11.75	0.87	3.09
Proteids	16.19	6.63	10.70
Crude Fibre	25.80	1.21	8.69
Ash	7.64	1.04	3.24
Carbohydrates	74.59	47.89	64.45

There is nothing to hinder the manufacturer of these products guaranteeing their composition as required for other foods in the Commercial Feeding Stuffs Act. In fact, the Chief Chemist strongly recommends the manufacturer of chop feeds, *i.e.*, feeds made from mixed or unmixed grains, ground or unground, to register such feeds and sell them under a definite guarantee.

In case bran, shorts and chop-feed are sold or offered for sale without a registration number, and without a special guarantee from the manufacturer or agent, the Chief Chemist recommends that the following limits be made legal:

	Crude Protein (Not less than)	Crude Fat (Not less than)	Crude Fibre (Not more than)
Bran	14.	3.	10.
Shorts	15.	4.	8.
Chop-feed	10.	2.	10.

With reference to the above standards, it is important that the three constituents be considered. Recently, a sample of bran was sent in for examination

which was found to contain more than the standard amount of protein and fat, and could not be considered adulterated if these were the only constituents considered; but, it also contained about 15 per cent. of crude fibre, which was one-half more than the standard allows. It is in this constituent that the addition of oat hulls would be most readily detected. It is expected that the adulteration of bran may be controlled in this way without requiring the guaranteed analysis to be stamped on the bag.

The Commercial Feeding Stuffs Act ought to be decidedly beneficial in three ways:

1. It will protect the stock feeder against low grade and mixed by-products with which he is not familiar.

2. It will protect the manufacturer and dealer against dishonest competition.

3. It will promote a more intelligent use of the mill by-products and thus directly help to bring about a more economic use of all feeding stuffs. There are some on the market that are dear at any price; others are good value at the prices asked.

It is to be hoped that farmers, dairymen, and all feeders of live stock will make themselves familiar with the terms of the Act, and so study the composition and price of the feeds offered for sale that they will be able to make the best possible use of these in supplementing the home grown roughage in producing economic gain, whether for growth, or fattening, or for milk production.

Q.—If they adulterate bran with this screening from the West would that be considered adulteration?

A.—If the screenings are brought in separately I think it would be. A great many millers contend that they should be allowed to sell anything that they are allowed to bring in. Of course, if they bring in screenings separately I consider it adulteration. Anything that is mixed in the bran would be adulteration.

Q.—Is that a Dominion Act?

A.—It is a Dominion Act. Questions of that nature are under the jurisdiction of the Dominion Government.

Q.—Does it apply to foods over the whole Dominion?

A.—Yes, just as our Fertilizers Act refers to fertilizers over the whole Dominion. My reason for bringing it up is that farmers should know that they have such an Act so valuable to them. They should pay attention to it, and not buy anything that is not stamped. The practice of mixing corn, bran, and wheat bran would come under the Act. If a man mixes them he must stamp it.

Q.—The practice of mixing Western wheat screenings would not come under the Act?

A.—I do not know about that; but we can get a ruling on that point. We ought to do everything we can to prevent the bringing in of these wheat screenings.

Q.—Do you think the Manitoba bran is equal to our bran?

A.—We do not find much difference in the composition. The harder wheats from the West are ground closer and more of the carbohydrates are taken away from the bran.

Q.—How do they compare in fibre?

A.—In general there is not much difference in composition. As a rule, the proteids are lower in the Ontario wheat and therefore in Ontario bran than in the Western.

Q.—You think the Western bran is a little better?

A.—Yes, it will stand a little higher.

Q.—Will Eastern wheat be lower in protein?

A.—The frosted wheat we find higher in proteid than the good wheat. The more mature the wheat the plumper it is because of the formation of the starch, therefore, in grain checked in its growth, it would be richer in protein.

Q.—Ontario fall wheat bran is more digestible, I am told, and that is why I asked the question as to fibre.

A.—I cannot tell you the exact difference, but there is very little difference between the two. We always find the richer the food in protein the easier it is to digest. Take it with only from 4 to 5 per cent. of protein, only 20 per cent. of that food was digested. Alfalfa hay contains about 19 per cent. of protein; 75 per cent. of the protein was digested. The higher the protein in the food the more digestible it is as a rule, and if we followed that out we would find that bran that is higher in protein would be higher in digestibility.

Q.—Does that apply to the fats as well?

A.—Not so much to the fats as to the proteids.

ANOTHER YEAR IN COW TESTING.

By Chas. F. Whitley, Ottawa.

[This address was also given at the meeting of the Eastern Association, and appears in the report of that gathering.]

ADDRESS OF WELCOME.

Dr. Guest, Mayor: It is a pleasure for me to have the privilege of welcoming the Western Dairymen's Association to what we believe to be the best city in Canada. I must, in the first place, congratulate the Dairymen's Association on the success of this their forty-third Annual Convention, and their eighth annual exhibit. You should be successful. You have the united and loyal and enthusiastic support of every dairyman and every agriculturist of the province of Ontario. Perfection in quality is what you are aiming at, and the product of butter and cheese in the Province of Ontario is such as to show that you stand second to no other in the great markets of the world. The Ontario Legislature, through the Department of Agriculture, is doing a great work along this line. They are giving schools and instructors to every part of Ontario, and this is bringing the young men and young women to learn the art of making butter and cheese. Public meetings of this kind that you have at your annual convention are an admirable thing. They are public educators. Let me say that I am pleased to see so many of the farmers with their wives, sons, and daughters of the surrounding township to-night. It shows that you are taking a deep interest in the matter, and I say this Association is a public educator. In 1904 we had the pleasure of having the Dairymen's Association meet in the city of St. Thomas, and I assure you that we are pleased to have you again in 1910. At that time we endeavored to entertain you, and to show you the beauties of our city; and now when you come back in 1910 you show that you appreciate

the efforts that we put forth. At that time we did not have this beautiful building, and I say that our thanks are due to the Engineers of St. Thomas for erecting this building in which you are holding this meeting to-night. We are in a position now, that no matter how large a convention wishes to come to St. Thomas, we will be able to stretch out our hands and say, we have a convention hall equal to entertain them. In a few years St. Thomas will be looked upon as the convention city of Western Ontario. After recounting some of the advantages of St. Thomas as a desirable place to live in, he concluded by saying, "I deem it a pleasure, as well as a great honor, to extend to such a noble body of men the hand of gladness."

Mr. N. G. Hay, President of the Board of Trade: I am sure it affords me as much pleasure as it has the Mayor, and as much pleasure as it does the citizens of St. Thomas, to extend on behalf of the Board of Trade a hearty welcome to our city. There is no body of men that we have ever had in our midst that we are more pleased to have than you. The only fault that we can possibly find with you is if you do not make St. Thomas your permanent headquarters. We have a beautiful city, and you can come here and we will take care of you.

On behalf of the Board of Trade I wish this annual convention every success. I do not intend to enlarge upon the possibilities of dairying or farming in any way. I do know, however, that our export of cheese and butter runs to a considerable sum of money, and that there is no better butter or cheese than is made in this Western part of Ontario. I have been buying butter from the same man for eight years, and that ought to be good evidence that he knows how to make it. I am sure he knows how to charge for it, because last Saturday I had to pay thirty cents a pound, but I know that it is worth it.

Ex-Mayor Geo. Geddes: I am certainly pleased to be present. It was at my invitation, endorsed by the City Council, that you were asked to hold your convention here in 1910, and out of courtesy, the Council insisted that I should remain on the reception committee until your Convention was over, and I am sure that it affords me a great deal of pleasure to know your previous Convention here was so successful that you decided to come back again, and I hope that at an early date you will again come to St. Thomas. I am not going to enlarge on the work you are doing. I know you are doing good work, because I have been taking milk and butter for a great many years, and I know the manufacture has improved very much.

The Chairman: I am sure I voice the sentiments of the members of the Western Dairymen's Association when I say that we wish to thank these gentlemen for their kind welcome, and I would ask you to endorse it by a hearty clap of the hands. (Great applause.)

DAIRYING FOR PROFIT.

By N. P. Hull, Dimondale, Mich., U.S.

I have a little advantage to-night, because I am sure that in talking to my friends the dairymen and the dairymaids, I have a topic that you will all be interested in. I cannot conceive why any man should put in his time feeding cows, milking them and taking care of them, unless he does it for a profit, and my theme this evening is, "Dairying for Profit." I hold that there are three or four things that every man must keep in view, if he is to make a profit in dairying or as large

a profit as he should. My subject should have been, "The Most Profitable Dairying," for it just seems to me that if we are going into this thing at all, and if we are going to put part of our life into it, we ought to put it in such a way as to get all that is possible out of it. In order to have the most profitable dairying we must make up our minds to have three things, because no man has ever made the most profit possible out of dairying without these three things. The first is good cows, and the second is that these cows shall be well and properly fed, and the third is, that they shall be properly cared for. I have had several years' experience in dairying. It has been my good fortune to go up and down the State of Michigan, and to be in all of the large dairying states, or most of all the dairying states in the United States. I have become acquainted with the leading dairymen, and I have had the advantage of getting acquainted with some of the leading dairymen of Canada, and I have not only my own experience, but the experience of the leading dairymen behind me. If you are to put your life into this business, you should put it in in such a way as to get the most out of it; and to do that you must have these three things, a good cow, properly fed, and properly cared for. It is not necessary for me to talk about the good cow to-night, because you have heard a great deal about it to-day.

Is dairying profitable? I want to look at this matter of profit in a large sense. Every man to-day, who is on a farm, whether in Michigan or in Canada, has always to keep before him two distinct propositions. First, we want to sell as many dollars worth of stuff off our farms each year as we can, which will carry with it the largest per cent. of profit possible. Does anyone want to question that? Of course you don't, because the profit you get out of your business for one year measures the value of that year of your life, and we certainly want to get as high a valuation as we can, so we all want to sell as many dollars worth as we can, carrying as large a percentage of profit.

The next thing that every farmer should keep permanently before him is that he should maintain or increase if possible the fertility of his fields in order that the next year and the year after he may continue to sell more dollars worth of stuff which will carry with it a larger per cent. of profit. There is not one here who wants to take issue with me upon that proposition.

Will dairying enable us to sell more dollars worth of stuff which will carry with it a large per cent. profit? I do not believe there is any animal upon the farms of Ontario or Michigan to which we can feed our crops that will turn it into as many dollars worth of produce with as large a per cent. of profit as will the cow. There has not been a year in the last sixteen upon my farm in which I could not have gone upon the open market and bought every dollar's worth of stuff I feed to my dairy cows, when these cows would not have paid for it and paid me a good liberal profit on it; and this is the only line of live stock I have handled on my farm for sixteen years that is able to do it every year. Dairying is the only line that I have ever tried that would enable me to turn a good liberal profit every year. I have nothing against the steer, I have nothing against the hog or any other animal. I have bred and raised sheep, I have fed steers by the carload, and I have fed a good many hogs, and I have got some profit. But let me make a fair comparison. Supposing you and I upon our farms have grown a certain amount of feed. We will call it a unit of feed, enough that we might take it and feed it to a two-year-old steer, enough to make him dress one pound more. What is a pound of dressed beef worth? I suppose it will run somewhere from five to fifteen cents a pound. If instead of feeding that to the steer you feed it to the dairy cow,

she would have converted it into a pound of butter worth twenty or thirty cents at least. Some one says there is more labor about the pound of butter, and that is true; but the difference in the cost of production is nowhere commensurate with the difference in the value of the profit. Three pounds of good milk furnishes the equivalent in digestible nutrients of a pound of beef steak, and it will be produced for a third of the cost. Another proposition. When I was a boy four years old my father died, and I was the eldest of the family. We were left in a little log house upon a little farm, and it was in debt, and we were in debt until I came of age. My brother and I, who is two years younger, cleared off that debt, and then being ambitious young fellows, we bought more land and got further in debt, until I have been in debt clear up to my neck. But I never laid awake worrying for fear the interest would not come due, and I never laid awake nights for fear the tax-gatherer would fail to call upon me; but I did have to lay awake once in a while worrying to know where I was going to get the wherewith to meet these demands. I wanted some business that I could tie to, that would give me a surety in regard to the income and outgo. I wanted to come as near insuring an income as possible, to meet these sure outgoes. I looked all over the field and decided on dairying, and I want to ask you, my friends, what kind of work can you show me upon the farm that eliminates the possibility of chance and speculation as dairying?

Take the hog. We start with a bunch of pigs to-day, and we keep them until they are six or eight months old, before we put them on the market. We know they are eating good food, but we do not know whether, when they are ready for the market, that they will bring enough to pay for that feed and give a profit besides.

Take a steer, if you like. Start out with one and you are going to keep him until he is two years old. You are feeding him good feed; you are doing a credit business with that steer. He will pay his debts if his carcass will yield enough to enable him to liquidate. But supposing he does not, then you are buncoed.

If I was at home to-day I would go along that alley of cows. Have I got to wait, as I do for a pig, for six months, to know whether I am going to get my pay? Or with a steer on a credit business for two years? No. In the dairy business fifteen minutes after I have fed those cows along that alley-way I step around to the business end of the cow and draw my pay from it. I will do that twice a day. Can you point me any other line of business that pays up twice a day? The nearest you can come to it is the old hen, but I never knew one of them that was willing to pay more than once a day. (Laughter.)

I was over in Southern Michigan talking at a Farmer's Institute, and I made the observation there that my cows a few years previously had paid me an average of $2 for every dollar's worth of feed. The next day they had a poultry session and a young fellow got up and said, "Hull stated that his cows paid an average of $2 for every dollar's worth of feed, but I can go him one better. My hens paid me $3 for every dollar's worth of feed, and I was not tied to a cow's tail, either." He went on with his talk and some one finally said, "Mr. Brown, were you ever troubled with roup?" and he said, "Yes, we have had roup." Then they asked, "Do you think it is contagious?" He said, "I know it is, for when my fowls had roup, my wife had the same symptoms, and I am sure she caught it from the fowls." "Were you ever troubled with lice on your fowls?" He said, "Yes, I have been. It was only about six weeks ago when I felt something crawling on my neck, and my wife said, 'What's that? Why, that is hen's lice!' and I got out there

and got after them right away." After he had said this, I concluded that if my wife had to get the roup and I had to be lousy, I would stick to the cow's tail. (Laughter and applause.)

Dairying is profitable. I just want to give you an illustration of profit in dairying. I was in Ohio last year doing Institute work, and the President said to me, "We have one of the best dairymen in Ohio," and he brought him around and introduced him as Mr. Stanley. I asked, "What are your cows doing for you?" and he said, "Here are the figures." The largest producing cow was giving over 14,000 pounds. I have had cows that would do better, but the remarkable thing is that the lowest producer yielded over 10,000 pounds of milk. He sold to the cheese factory, and his average for nine months in the year was $160.14 for the milk, and his feed bills were a little over $55. Now this is about as good as I ever heard, where the man sold to the cheese factory, or at the ordinary wholesale price of milk.

That man started twenty years ago with one cow, and he knew how much that cow gave, and he kept a record of every cow he has since that day, how much milk she gave night and morning. That man tested every heifer, and if she gave milk enough, she stayed on his farm, and if she did not, she got off his farm; and he has got about him a herd of cows that yield him an average of $160.14 of milk, and his calves sell at a young age at $59 each, which makes an income per cow of $219.14, for a feed bill of $55 and a little over. Therefore, I say, my friends, dairying is profitable if you do the right sort of dairying.

I have told you the best thing to do, and now I am going to tell you the other side. Over in Michigan, I went about one factory and I inquired of every patron the number of cows they had, and asked them to find out how much they fed their cows, and I looked to see whether they had decent barns in which to keep their cows. I wanted to find the average conditions. I went to the factory and asked them to let me see their books, and I figured them up to see how much money they had paid each man. I divided each man's money by the number of cows he had, and I found that the lowest man received $22 per cow. That is all he received, and I found when I turned over how much it cost to keep his cow, that for every dollar's worth of feed given to the cows they returned him 76 cents. I have said to you that dairying is a good business, but here is a man who put in his time growing feed that he could have sold on the local market for a dollar, but instead of doing that he fed it to the dairy cows and that lowered the value down to 76 cents. There was another man at that factory who was getting $79, and I found for every dollar's worth of feed he fed his cows they returned him $1.95 for it. These men live just exactly a mile apart, and delivered their milk to the same factory, yet one man only received $22 and the other $79 per cow. One man put enough intelligence and brains into his business to make a success, the other man did not; and I say to you if you do not care enough to make a success of your business and put a little intelligence into it, then don't go into dairying. I cannot see why a man should be willing to feed and milk these cows twice a day, and be there on the ground 365 days in the year unless he gets something to show for it.

To get the most possible out of business you must put some intelligent, painstaking care into it, and if you are not willing to do that then don't go into dairying; or if you are in it get out of it.

Over in Michigan I had some real good men who would take their Bibles and sit down on a Sunday morning and read over that good old story of Pharaoh and

the children of Israel, and how that mean fellow insisted upon the children of Israel making bricks without straw, and the injustice and cruelty and tyranny of that thing, when Pharaoh insisted on his servants doing a thing that he knew could not be done. These same men turn around and condemn their cows because they do not give them profit, when they have demanded of her exactly the same thing that Pharaoh demanded of the children of Israel. It is too much like trying to make bricks without straw. It is not possible for a cow to give a profit if you do not give her proper feed. The question came up here to-day whether it paid to feed intensively or not. I have a little experience in that, and I will give it to you. When I commenced dairying I kept track of the cost of the feed, and when I first commenced it cost about $30 a year to feed the cows, and I got about $40 of milk per cow, so I was making $10 per cow profit. I thought there were a lot of men making more money than that per cow, and I wanted to make more. In fact I had to make more. I do not know that any of you will get caught just as I did. But I had to make a success of that business.

I took a notion to a certain girl, who was teaching in the neighborhood, and I told her of it. She was from Missouri, and she said to me, "I am getting $50 a month teaching school in the city, and I do not care to go into partnership in any business that is not worth $50 a month," and it was up to me and I had to show that "school ma'am" that partnership in my business was just as good as $50 a month teaching school in the city. And there was just one thing for it: these cows had to give more milk and show more profit, or else the school ma'am was not mine; and of course it goes without saying that they gave more milk. (Laughter and applause.) I made some inquiries and investigations and experiments, and I found that it took $20 worth of feed, as feed ran then, just to maintain the cow. I had a thousand-pound cow on the first day of January, and she ran dry, and for a year did not give any milk, and I kept her for that year and it took $20 worth of feed to keep her. I found that I was $10 out on that cow that year.

I also learned that a cow ought to be fed regularly at the same time every day, and I found that to enable that cow to do her best she must have a variety of food and she must have palatable food. I found that everything about the manger and the barn must be kept sweet and clean, if I was going to keep that cow up to the maximum capacity. After I learned to feed that cow regularly, to feed her a variety of food and to feed her palatable food and keep everything clean about the barn, I got her to eat $40 worth of feed. These are exactly the figures that we worked out in my own dairy. When I fed $30 worth of feed and got $40 worth of milk, I made $10 per cow. But when I got them to eat $40 worth of feed and yield $80 worth of milk, I made $40 per cow profit, or as much in one year's dairying as I made in four year's dairying. Take any sort of machinery that you and I ever ran and made a success of. Did you ever run it on any other principle except running it to the maximum—running it up to its full capacity? Every man who is running a machine knows he must run it up to its full capacity in order to make the most profit, and the same thing is true with a dairy cow. I know that you can feed a cow too much, but you are not doing it when you are running the machinery up to the full normal capacity. I can find hundreds of men over in Michigan who are lying awake at night multiplying contrivances to get their cows to eat less, when they ought to be trying to get them to eat more. The average three years ago was $27 per cow. That meant that a man puts in $27, $20 of which runs the machinery and $7 to be converted into milk, and then he condemns

the cow because he does not make any profit. Making "bricks without straw," no question about it. He does not furnish her enough feed.

Feed regularly. Why? The cow will be better if fed regularly. While we were in the habit of feeding at a certain hour, if some event came along that put that off we could depend upon it that out of 50 cows we would drop from 40 to 60 pounds of milk. We feed just as much, but we lose that 40 or 60 pounds out of the profit, and we cannot afford to do it. Therefore we try to be regular in feeding cows.

Have a variety of feed. Why? Because the cow will do better upon a variety of feed. I remember being once in Allegheny County. I had been there six years hand running in Institute work, and had been advising men to build silos. A man came to me and said, "Hull, I have been hearing you at this Institute for over five years, and always hear you recommending to build silos. I built a silo and fed my cow silage, and although I am geting a little more milk to-day, my cows do not look as well as they did before I had the silo." I said, "What are you feeding your cows besides silage?" "I am not feeding them anything else," he replied. "Well," I said, "did I ever come down here, my friend, and advise you to build a silo, and then just feed your cows silage?" He said, "No, I do not think you did; but you said silage was awful good food." I said, "It is. Well, my friend, don't you like fresh pork?" and he said he did. "And it is a good food?" and he said, "Yes." "Well, then," I said, "in the name of common sense, when you are butchering, why don't you get your wife to feed you fresh pork, morning, noon and night, until your pork is gone? That is the principle you have adopted in feeding your cows." Well, of course he knew right away then that he had done wrong. Although we all like fresh pork, if we had to eat it morning, noon and night, we would not care much for it. We all like a variety of food, and so does the cow. It encourages the cow's appetite, and she will eat more.

The next proposition is to feed her palatable food. We hear a great deal about balanced rations. The balanced ration is all right; it is nothing but common horse sense. It is simply furnishing a cow with the material she must have to run her machinery and make milk. If I could have a palatable unbalanced ration, as compared with an unpalatable balanced ration, then I would take the palatable ration every time. The longer I study dairying, and the longer I feed cows, the more I am satisfied that there is no one attribute to a ration that begins to be so valuable as that one attribute of palatability. Get feed that will taste good to the cow, and she will digest it better and feed better and do better work, and pay you larger profit. I am satisfied that the benefit silage gives is largely from its palatability. Professors of chemistry have made experiments, and they cannot find more digestible nutriments in the silage than they can in the field corn. And I am satisfied that a large part of the value that comes from silage is that the cow likes it so well.

I have been laughed at in Michigan because I have a covered barnyard. We simply took the fence away from the barnyard, put up a stone wall around and built a big building 80 by 90 feet, with matched siding and a good shingled roof and a cement floor, and from the time the cows come in from pasture until they go out to pasture in the spring they are never exposed to the weather. We turn the cows into the covered barnyard in the morning, and then ensilage is thrown down, and the stable is cleaned, and the silage put in the mangers, and then as soon as you begin to mix that ensilage to make it smell, you will see these cows stand up, ready to be

invited in. And I have seen the saliva dropping from their mouths; I have seen it running in a stream from their mouths. What does that mean? It means that their mouths are watering; there is no question about it. If a man does a good steady day's work and is healthy and gets good and hungry, if he thinks of something to eat his mouth will water. These glands that exude that saliva are controlled by the great sympathetic system of nerves, and when it excites these glands, it also excites the glands of the stomach and the intestines. I have talked this over with professors of agricultural colleges, and they agree with me. I am thoroughly satisfied that the cows will digest it better because it is palatable; and I use it more, and it puts more milk in the pail, and it makes me more butter.

We not only want silage, but we want hay, either clover hay or alfalfa. What is it that makes that palatable? I could take any one of you farmers to a mow of clover hay blindfolded and you will tell me whether it is good hay or not. You run your hands in and get a wisp of it, and if it has the right aroma, you will say, "This is good hay." Don't you think that a cow that has been in the hay business all her life knows as much about it as you do? You should get it cut early before it gets too much crude fibre in it.

I commenced farming when I was fourteen years old. I said to a neighbor, "Is it not time to cut the clover hay?" He said, "Not yet, my boy." I asked him when I was to cut it, and he said, when two-thirds of the heads were brown. I asked another fellow. I said, "Do I wait until two-thirds of the clover heads are brown?" and he said, "No, it will be too ripe. You ought to cut it when an odd head is brown." I asked another old gentleman. He said, "You want just one brown head in the field, if you want the best yield, and you want that brown head to be on the shoulders of the boy riding the mowing machine." And that is about right. You should cut that hay when it is in full bloom, cure it well, and when you put it before the cow she will eat it.

It is not necessary to say anything about the desirability of keeping things clean and sweet.

I do want to say something in regard to the care of the cow. I have travelled over this country as well as over other countries. I saw evidences in this country, as I saw in Michigan, that you do not keep your cows as comfortable as you should. They should be quartered in well-lighted and ventilated stables. We hear a great deal about tuberculosis among cows. There is a lot of it. Why? I fancy a very large amount of it comes from the fact that they are kept in farmers' barns that are poorly lighted and ventilated where you would not think of keeping your families. There is nothing that is more healthful than the direct rays of the sun, and there is nothing that will kill off germs more rapidly than the direct rays of the sun, unless it may be strong chemicals. Then have your barns well lighted and ventilated and keep the cows comfortable, which means keeping them warm. Over in our State I was driving along with a gentleman who came from Canada, one cold, bleak blizzardy morning, and we saw a herd of cows running around a straw rack. This Canadian farmer looked at the cows, and then looked at me, and he said, "Well, friend, there is a man's advertisement, and the barns and the rickety buildings and fences; there are the results of his business methods." You can put it right down as the first principle of this business that if your cows are running out when it is cold and disagreeable, you are advertising a system of dairying that is bound to lead to poor results. Many a man has come to me and said, "Well, Hull, it is all right for you to talk. We all know that you have great bank-barns and covered barnyards, but we cannot do that." And I say to

them: "I would never have had that bank-barn and covered barnyard if I ha not made conditions right, so that the cow could make profit enough to allow m to build a bank-barn and a covered barnyard." I commenced in a little she leaning up against a little barn. The building paper was cheap enough, so tha I could make that little shed warm, and it is cheap enough to-day, so that an man can afford to make his stable comfortable. Window lights were cheap enoug then, and they are cheap enough to-day. No man is so poor that he cannot giv his cows plenty of fresh air. If you cannot put in a modern system of ventilatio borrow your neighbor's saw or axe and make a hole in the barn and tack over 5 cents worth of muslin, and that will provide for ventilation. It is not the be system in the world, but it is away ahead of nothing. Then get your cow an feed her properly, and she will give you good profits. Don't ask the cow to mak bricks without straw. Get a good cow and feed her. She ought to have enoug to eat to run the machinery, and then furnish that machinery with all the foo it can take. See that you are giving her all that. See that you are doing you part, my fellow-dairymen, towards making it possible for the old cow to do he part. Then furnish her well-lighted and well ventilated quarters, and there no animal that ever roamed over these fertile fields of Canada that will do mor to help her owner, and enable him to put more money in the bank than will tha good dairy cow. (Loud applause.)

THE CHAIRMAN: It affords me a great deal of pleasure to introduce to yo a gentleman from the eastern part of the Province, who has just vacated the offic of President of the Eastern Dairymen's Association of Ontario.

ADDRESS.

BY JOHN R. DARGAVEL, M.P.P., ELGIN.

Your President has said that it affords him much pleasure to call upo me to address you. I am sorry that the pleasure is not reciprocated. Althoug I have been some time in public life, I have never acquired the art of speaking a I would like to, and I always feel a little nervous when I face an audience of thi size, and judging from the faces here you are an audience of much intelligence I am here to-night only to bring a message from the Minister of Agriculture, th Hon. Mr. Duff, who was unfortunately unable to be present on account of Cabine duties preventing him from leaving Toronto. He was with us in Belleville las week, and he said that, if possible, he would like me to come to-night, as he sai his duties would prevent him from being with us. We were very glad to hav the Hon. Mr. Duff with us last week, he gave us a splendid address, and we gav him a good reception. We were glad to do so because we feel that we owe Mr Duff as Minister of Agriculture, considerable gratitude for the liberal way he ha acted with us at all times, and I am sure your President and Directors will bea me out in this, that any time we have gone to Mr. Duff looking for any change in our sanitary laws, or anything pertaining to dairying, or to ask for any grants he has always treated us very generously. He has always been our friend as th two Ministers of Agriculture who preceded him were our friends. We have beer very fortunate in that regard, we had Hon. Mr. Monteith, and prior to him, Hon John Dryden, who was always ready to listen to our claims and to help us in every way.

I will not pretend to instruct you, because you have experts here in every line, and you have already had a good practical address. We have sent from the east some men who, I am sure, will be able to give you some advice and information along technical lines. We have with us a gentleman who is the Chief Instructor for Eastern Ontario, Mr. G. G. Publow. We have also an able gentleman here, formerly your Chief Instructor, who is now engaged at Ottawa, Mr. Barr, and who will tell you how to take care of your milk. I bring you greeting from the dairymen of Eastern Ontario. We are not blessed as you are in the west with such a beautiful fertile country. We have mostly rough broken land, particularly adapted for dairying, but not adapted for grain, and consequently we have gone more largely into the dairying industry than you have in the west. In fact, we were forced to do so. Years ago we had to give up growing grain, and as you have a much finer country than we have perhaps your climatic conditions are also better than ours. Yet there is one thing that I will undertake to say, that we cannot excel you in raising, and that is we have very few mortgages on our farms in Eastern Ontario, and this state of things has risen from the fact that we have been in dairying for so many years that the old mortgages have been paid off and 95 per cent. of our dairymen to-day are prosperous. But we have not arrived at that state of excellency that we would like, by any means. We are just beginning to find out how much chance there is for improvement. They say when a man finds out that he does not know everything there is some hope for him then. We are finding out that we can make more improvement along the line of caring for our stock, and that we have a chance to make great improvement in the sanitary conditions of our stables, and that we have a chance of making improvement in the building of our cheese factories. We are mostly in the cheese business. We have not a great many butter factories or creameries in the east. We have made wonderful progress, and I am sure you will be glad to hear that we have made great improvements in our factories in the last two years. Mr. Publow will be able to tell you of the thousands of dollars that have gone in our factories in the last year, and that has been going on steadily now for some years. Evidently the Sanitary Act that was passed a few years ago has helped us along these lines. We have on the road in the east 24 Instructors who are engaged all the time in looking after the factories in our jurisdiction, in addition to the Chief Instructor. These men are busy on the road all the time, and they are doing first-class work. We are all interested in the excellence of our product. We want to see you in the west turn out the very best cheese that can be made, and I am sure you have the same wish for us. We feel that we are justly interested in the quality of goods you turn out as well as the quality turned out in our section. When our cheese goes to England, it is sold there on its quality as Canadian cheese, and it is on the general quality of that that the price is fixed. That is one reason why we employ these instructors and send them around through the country, so that we will make a uniform article in every factory, and when it is placed on the English market it will be of the best quality. From the report that we have from our instructors there is a steady improvement being made along these lines. We are producing a good article in the east, and I am sure under the able instruction of Mr. Herns, of whom we have heard in the east, you are making steady improvement. I have also brought a message from your representative in the Legislature, Mr. Macdiarmid. I left him this afternoon at Toronto. He was busy engaged in completing his labors on the Milk Commission, and he hopes to be with you to-morrow night. I wanted to come west to see what kind of a constituency Mr.

Macdiarmid had, and I am very well pleased. I might say something to you along the educational system that we have, but I won't go into that as I know you are anxious to hear the experts who are here to address you.

THE CHAIRMAN: I wish to pay my tribute to the last speaker. We feel here in Western Ontario that we have in Mr. Dargavel a very able man, who has at all times assisted the committees who have gone to the House to appeal to the Minister. Mr. Dargavel has always worked in unison with us. He has been a very able man and of great assistance to us in our requests, and it is only due to him that we should show our appreciation of his serices. I am sure I voice the sentiments of the Western Dairymen's Association, when I make these remarks.

ADDRESS.

BY C. C. JAMES, DEPUTY MINISTER OF AGRICULTURE, TORONTO.

I was wondering when you were applauding and encoring the very fine music you have had, why we were not inclined to encore speakers, and compel them to repeat their speeches. Perhaps it is because the singer is able to get a little further into our being somewhere, and is able to reach spots that the best speaker cannot touch. He is able to stir our feelings, and we like to have our feelings touched, we like to be stirred, we like to be stimulated. It seems to me there is just a little lesson in that, in regard to dairying, fruit growing, live stock work or farming in any of its aspects. In fact, in any line of work that we may take up, if we can only get our feelings aroused in this work everything will go all right. The first speaker came up to that point and illustrated it, and if we can only get our feelings going properly in connection with this dairy business, there will be no question about the general success of dairying in Ontario, and the individual farmer will, to a large extent, succeed with the dairying just as he gets his feelings aroused by the business that he is engaged in. If he is indifferent, and has a don't-care air about him, and does not keep in touch with the market, and does not take any particular interest in the kind of animal that he owns or the kind of feed that he is feeding, or the care that he gives, you know exactly what will result.

Here is another man, who is kind and attentive. He puts not only his brains into the business but his feelings also, he has his interest aroused, and no matter what may be his start or what may be his handicap, or what may be the difficulties he is likely to encounter in connection with his work, if he has only got his feelings aroused you know very well he will come through all right in the end.

In the month of August, this summer, I took a short run down from London to Bristol, and a friend there who was taking some little interest in me and my work suggested that we take a trip through the county of Somerset. I accepted his invitation, and we got into a fine automobile and took our route through the county over the finest roads that I suppose are to be found anywhere in the world. Gradually we began to climb a hill until we were up at the top, where the air was clear and the outlook fine. One felt like drawing deeper breaths of air, and we began gradually to go down the other side, and the road went in and out, and the cliffs became higher, and at last we were going through a gorge with piles of slate rock rising almost sheer on each side. We passed by a great crevice in the rock, and that was pointed out as being the place where Toplady took refuge

in the great storm, and while there composed the hymn, "Rock of Ages." And then as we came out in the widening of the valley, there was a beautiful little village, and I do not think that I had my feelings more stirred during the three months I was away than when I stepped out and walked up and down and in and out, because I was in the old village of Cheddar. That meant something, and I thought of the Cheddar cheese of old England, and the Cheddar cheese of Canada, and I shall never forget the impressions that came over me as I stood there in the place where Cheddar cheese originated, and that gave name to that industry, which means so much for this country. Of course the cheese industry is disappearing from old Cheddar. They are doing a little dairying here and there, and the old original glory of that place has departed; but the beauty of the place and the associations well repaid me for visiting it even under circumstances which perhaps may have taken me elsewhere.

I had a letter of introduction to the manager of the Aylesbury Dairy, and I went over and presented it. I spent three or four hours going over that institution with the manager and his assistant, and I want to give you just briefly a few points in connection with the work of the Aylesbury Dairy in England. The milk, which is largely produced for city consumption, is drawn mainly from the county of Cheshire. Cheshire cheese suggests itself. A farmer up in Cheshire thinks he would like to supply milk to the Aylesbury Dairy. A form is sent to him and he is required to fill it out. If you look over that form you will find that, before negotiations are entered into at all, that man must give a full description of himself, his family and people living or working upon his farm, the class of buildings, the number of cows, their condition, and general style of the farm, and the water supply—a little more than what we ordinarily imply by the water supply, in this country. They have got to know just what kind of water is given to the cows to drink, and also what kind of water is used in washing the dishes. I want to impress upon you the thoroughness with which everything is done from start to finish. If this application looks favorable, a veterinary is instructed to go out and report upon the health of the animals, and a long report is sent in. And then the local medical health officer is sent to make a report upon the man and his family and the general neighborhood, and a long report is sent in by him. Then samples of the water are sent in, and an analysis of the water that is used for drinking and also the water that is used for cleaning the milk tins and cans, and if these three reports are favorable—that of the veterinary, medical health officer, the chemist or analyst—then, and not till then, is a director ready to start business with that man, and a contract is entered into. The supplies come in regularly every month, and the veterinary goes to that farm every month and looks into the health of the animals, and if one is at all suspicious out that animal goes. Then along comes the medical health officer every month, and reports upon the health of the people. Well, you say, supposing measles or scarlet fever or any disease breaks out, what happens? At once the milk supply is shut down. Not one can of that milk goes up to London to the headquarters, and the man who owns that farm, who supplies the milk, does not lose one dollar. Don't you see it is to the advantage of that man to be honest and straightforward? He doesn't lose anything because of an outbreak of sickness on his farm. The company say to him, "You be fair to us and we will be fair to you, and so long as there is any reason, whether sickness in your family or an employee upon your place, you will not stand any loss."

Samples of the water are sent up twice a year to be analyzed, and the milk comes to the headquarters with a guarantee that it is coming through a safe, sanitary, reliable source. They go a step further than that. Not only do they keep daily watch upon the herds and the human beings upon the farms, but they also keep close watch upon every person who is served with milk. The consumers, also, are looked after. If the Medical Health Officer comes upon a family where measles or scarlet fever has broken out, the supply is at once stopped, and they no longer deliver milk there at that house by the regular supply, but a special messenger is sent so long as there is any disease. This special messenger never enters the dairy, and the bottles are taken to a separate department and treated there. I asked the manager as to feeding and care, and he said, "We have not any regulations; they feed what they like." Do they feed what they like? No, they don't. The moment a can of milk arrives at the headquarters a little warm, or a little off flavor, or a little suspicious, they analyze it, and if there is anything wrong the can is set aside and that individual case is enquired into, and it goes right back to the source; and if there is something wrong in the feeding the representative of the company goes straight to that man and points out to him his error and it must be rectified. If something has gone wrong with the water supply it is detected and rectified. If by chance something has happened the cows that must be remedied, or if there has been want of care in the transportation, that is looked into. The whole thing is built upon the principle of following up every individual, and the result is that the Aylesbury Dairy in London is to-day supplying a very large number of hospitals, and has a trade which is the envy of every other dairy company in the city of London. From start to finish nothing is overlooked. There is thoroughness from top to bottom, and they have a world-wide reputation.

I had an opportunity of spending a few days in Denmark, and the moment Denmark is mentioned, you picture our great rival in the London market. Denmark is competing with us in the London market, and as you go through that country and make enquiry, you say, "How has all this been brought about?" It has not been brought about in a day or a year, or in five years or ten years. It has not been brought about by simply observing feeding principally. It has been brought about by putting into practice some of the principles I mentioned in connection with the work of the Aylesbury Dairy—that is, thoroughness from the bottom up. Some twenty or thirty years ago, the people of Denmark were in a state of uncertainty. Originally they were producers of grain, which they shipped in large quantities to Germany, and competition became keen. They began to raise hogs and they were shipping them alive to Germany. They soon found out that that was to be prohibited, and they sat down to study out the whole matter carefully. Here was a small country comprising some 10,000,000 acres of land in all. A small people, fewer in number than the people of the Province of Ontario, left in just about the same position as the farmers of the Province of Ontario were left when some twenty or thirty years ago the McKinley Tariff built up an inseparable wall between them and the Americans to the south. Some little time before this they had inaugurated a system in Denmark which was growing and growing, until it was beginning to assume pretty large proportions, so that practically every person in that country had what we might call a common school education. There were practically no uneducated people in Denmark. They saw that they must develop along special lines to meet the requirement of the English market which was then open to them, so then they began to produce the three

things for which they have become so famous: bacon, butter and eggs, and they have done it thoroughly. They have not simply given special attention to one aspect but they began from the foundation, thoroughness in the work. The farmers organized themselves and began to discuss these questions and to ask for information. The government came to their assistance. Agricultural Schools were established. The Agricultural Colleges of Denmark at Copenhagen and the Veterinary College allied with it, were formed. Specialists who were engaged in these schools and colleges work in connection with the farm work in Denmark, and a great deal of improvement has been made. Their work has never been excelled and never equalled by any other country in the world, and the result to-day is that little Denmark exports agricultural products worth $90,000,000 every year, and about $80,000,000 worth goes to the British market. Out of $100,000,000 exported to other countries, about $90,000,000 are agricultural products. Don't you see that agriculture has been made practically the sole industry of that country? What has been the result? There are of course a few cities, for instance, the great city of Copenhagen, about the size of the city of Toronto. There are a few other towns, but the wealth of that country is not in the cities. It is not in its great millionaire manufacturers. The wealth of that country is spread all over that country. The wealth of that country is built up by the agricultural community, and the wealth of Denmark is second on the whole continent of Europe. You don't see great palaces or evidences of immense fortunes, but you see everywhere three or four things—intelligence, evidence of prosperity, no slums, everybody having enough and to spare; and you see contentment. I do not think I ever saw a more contented people in my life than I saw in the city of Copenhagen, and in the various parts of Denmark.

There is something about them that is a result of their development which attracts one to them, and to say, "Here is a work that is built up from the ground thoroughly and the results justify that thoroughness." We are all apt to consider the old countries in Europe out-of-date; but wherever you go there you will find thoroughness. It seems to me that in connection with agriculture in the Province of Ontario, as in every other province, and particularly in connection with this great dairying industry, we have got to get that same principle completely put into our practice. Sometimes we pile up the figures by the million, and say our exports are so many millions, and we are absolutely satisfied with ourselves. I was on a farm in southern Sweden looking over the establishment, and I saw the finest dairy barns I ever saw on any farm in any country. The farmer had fifty cows, and he kept a record last year of each one of these cows, and they averaged within just a few pounds of 10,000 pounds. That man had built that up on thoroughness. Don't let us be satisfied with piling up big figures by the millions, and saying that the dairying industry of the province of Ontario is a big thing. Does it make the individual dairyman any better off to be told or to know that we have reached a certain point in our production? The question comes up to you after all as an individual, and the proper aspect for you to take, the proper standpoint from which you as dairymen ought to look at the question, is that of the individual. If we neglect the individual, these great millions of exports will very soon disappear. Frequently you will find a man who is a great authority on cows, he is very strong on that point. Another man is more or less negligent of that, but he makes a study particularly of foods and rations. Another man is particular about the handling of the milk, and so on. Don't you see that this question is not a question of the cows, or the feed, or the care of the milk,

but, as Mr. Hull stated, it is a great big circular question, taking in a great complexity of questions; and the man who is going to succeed has to be so thorough that he knows something about these things which go to make up that circle. But you may have all that knowledge and still fail. You may be the greatest expert in connection with the judging of dairy cattle, you may be the most learned man in connection with chemistry, you may be the most expert chemist or bacteriologist, and yet you may fail. The man must have that interest in his work, that love for his work, that desire to apply his knowledge, which will take a little knowledge and make it go a long way. That is the thing we most need in this country at the present time. We have enough knowledge. It is before us every day. Our agricultural papers are filled with it; the books we have in our houses and the daily and weekly papers are filled with knowledge. We get more than we can consume. That is not the point. The point is, how much of this are we assimilating and putting into practice in connection with our work? This question of the development of the dairying industry of the province of Ontario means everything to the individual dairyman. It is a thing of no consequence to him if all the other people are prosperous if he is not prosperous, and we have got to get it down to the individual. But the progress and development of dairying in Ontario, taken as a whole, means a great deal for this country. We had the Premier of Canada in Toronto recently, and he delivered an address mainly made up of information with regard to the development of this country. The next morning I read that speech carefully, and there were two things that stood out. One was the wonderful development of the agriculture of the Western Provinces, and the second was the wonderful discoveries of mineral in Northern Ontario. I think Sir Wilfrid Laurier did not know, or had forgotten and overlooked at the time, that last year the Province of Ontario in its field crop produced about ten million dollars more than did Manitoba, Saskatchewan and Alberta put together. (Great applause). And there are some others whose speeches have appeared recently in the papers who seem to be casting their eyes away from this Province. Don't let us forget that we have here in the province of Ontario a country with conditions and possibilities that no other part of the Dominon of Canada possesses, and no other part of the North American continent possesses, and don't let us be misled by these speeches, well meant as they may be. Although we have in the Prairies of the West, or the Mountains of British Columbia a great climate, there is a greater land than they have right here. One has only to look over an audience of this kind to see evidences of the prosperity of Ontario. You people are all fairly well to do, and I suppose if you were to tell us exactly what you have been doing it would be a little better than fairly well. You would not continue in the dairying business if you were not fairly prosperous. I suppose the farmers of this province, taking them as a whole, have had more prosperity these last few years than any other class of the community. You are not becoming immensely wealthy, and you would not be any better off if you were, for you are better off to be well off than to be immensely wealthy, although I suppose you would be quite willing to run chances along that line. It is for your own good that you are in a business where immense wealth is not to be found, but where a good living is to be had. There is no class of the community in Ontario that is in the position of having so many advantages of the home life as the people of rural parts. Unfortunately I have to live in the city, and every once and a while I say to my growing boy: "My dear boy, you will never know what you have missed by being compelled to grow up in the city." The province of Ontario still stands as the premier province of the Dominion.

The dairying industry should continue to be the most important part. We have our great fruit industry, and we must look to the fruit men to see that it is properly sustained. We have also our great live stock industry, and we must keep advancing it. But we can only develop these industries by going more thoroughly into the work, and thoroughness will depend on the individual dairymen, fruit men and live stock men of this country. Let us not decry what we call sentiment, true sentiment. Sentiment is that which helps a man to carry a heavy load as though it were a light one. Sentiment is that which enables a man to get up before daylight in the morning without grumbling. Sentiment robs the day of its drudgery. Sentiment causes respect for the father and veneration for the mother, and makes the boys and girls look upon that house not as a house but as their home. Give me a rural home, where all are working together, where the father and mother and the boys and the girls are all interested, and in the work, and where there is a true sentiment, and I have no fear of what is going to become of these boys and girls. Around that family there is going to be entwined that love of home which can never be forgotten, and there are going to be noble characters developed in these homes, humble though they may be. I know of no characteristic which is more powerful and more potent in the upbuilding and development of any country than the development of a strong, true, noble home life, bound together by the truest sentiment.

I wish the dairymen of Western Ontario even greater success in 1910 than they had in 1909, not simply and solely for the individual success, but for the sake of the people in our towns and cities as well. These poor people who are compelled to live within the narrow confines of town life or city, who do not know any thing of the generosity of air and sunshine. I therefore wish you success, because upon it will depend the prosperity and success of the welfare of the province of Ontario, which after all is the most important in connection with the people of the Dominion of Canada. (Applause).

NOMINATING COMMITTEE.

The following were then elected as a Nominating Committee:—H. White, R. Myrick, Jas. Symington, E. Ginther.

REPORT OF COMPETITIONS OF CHEESE AND BUTTER.

Prize List.

		Total Score.
September White Cheese—		
1st.	Prize, Mary Morrison, Newry	96.68
2nd.	" B. F. Howes, Atwood	96.57
3rd.	" J. E. Stedelbauer, Listowel (preference for flavor)	96.49
4th.	" C. J. Donnelly, Scottsville	96.49
September Colored Cheese—		
1st.	Prize, Donald Menzies, Milesworth	96.15
2nd.	" A. M. Herries, Lake View	95.98
3rd.	" B. F. Howes, Atwood	95.82
4th.	" Fred Cornell, Hawtrey	95.65

October White Cheese—

1st.	Prize, J. E. Stedelbauer, Listowel	96.49
2nd.	" C. J. Donnelly, Scottsville	96.41
3rd.	" J. H. Williams, Embro (preference for flavor)	96.33
4th.	" R. A. Thompson, Atwood	96.33

October Colored Cheese—

1st.	Prize, J. E. Stedelbauer, Listowel	95.99
2nd.	" A. E. Shapland, White Oak (preference for flavor)	95.66
3rd.	" W. A. Bell, Pine River	95.66
4th.	" C. M. Firby, Paynes Mills	95.65

56-*lb. Box, Winter Creamery Butter—*

1st.	Prize, J. A. Waddell, Kerwood	95.98
2nd.	" A. G. Patterson, St. Thomas	95.15
3rd.	" R. A. Thompson, Atwood	94.99
4th.	" T. J. Humphrey, Avonbank	94.73

20 1-*lb. Prints, Creamery Butter—*

1st.	Prize, R. A. Thompson, Atwood	96.32
2nd.	" E. M. Johnston, Innerkip	95.99
3rd.	" R. Johnston, Bright	95.90

56-*lb. Box, October Creamery Butter—*

1st.	Prize, Wm. Brown, St. George	96.56
2nd.	" H. B. Lowe, New Dundee	96.15
3rd.	" J. A. Waddell, Kerwood	95.90
4th.	" W. A. McKay, Scotsburn, N.S.	95.23

SPECIAL PRIZES.

By the Heller & Merz Co., 22 Cliff Street, New York: To the buttermaker securing the highest score on butter in Class III and IV, colored with Alderney Butter Color, $10 in cash, Wm. Brown, St. George.

To the buttermaker securing the second highest score on butter in Classes III and IV colored with Alderney Butter Color, $5.00 in cash. C. Richardson & Co., St. Marys, Canadian agents for Alderney Butter Color, R. A. Thompson, Atwood.

By The R. M. Ballantyne, Limited, Stratford, Ont.; One case of Hansen's Rennet Extract to the Cheesemaker securing the highest score on September white cheese, Class I, Sec. 1, Mary Morrison, Newry.

One case of Hansen's Cheese Color to the Cheesemaker securing the highest score on September colored cheese, Class II, Sec. 2, J. E. Stedelbauer, Listowel.

By C. H. Slawson & Co., Ingersoll, for D. H. Burrell & Co., Little Falls, N.Y., manufacturers of Chr. Hansen's Rennet Extract and Color: One case of Hansen's Cheese Color to the Cheesemaker securing the highest score on September colored cheese, Class I, Sec. 2, Donald Menzies, Molesworth.

One case of Hansen's Rennet Extract to the Cheesemaker securing the highest score on October white cheese, Class II, Sec. 1, J. E. Stedelbauer.

Note.—All cheese competing for the special prizes offered by The R. M. Ballantyne Limited, and C. H. Slawson & Co., must be made with Hansen's Extract and Color. No special cheese required.

By the J. B. Ford Co., Wyandotte, Mich.: A handsome gold watch, Elgin or Waltham movement, 20 years guaranteed, value $20.00, to the Cheesemaker who is a regular user of Wyandotte Dairymen's Cleaner and Cleanser, having the best finished and most stylish looking cheese on exhibition, J. T. Donnelly, Union.

A handsome gold watch, Elgin or Waltham movement, 20 years guaranteed, value $20.00, to the Buttermaker who is a regular user of Wyandotte Dairymen's Cleaner and Cleanser, having the neatest and most attractive exhibit of butter, R. A. Thompson Atwood.

Note.—All exhibits are eligible for these two special prizes.

By the Canadian Salt Co., Windsor, Ont., E. G. Henderson, Manager, $30 in cash to the Buttermaker securing the highest score on butter exhibited in any class, Wm. Brown

$20 in cash to the Buttermaker securing the second highest score on butter exhibited in any class, R. A. Thompson.

Note.—No special butter required.

By the Western Salt Co., Mooretown, Ont., N. A. Leach, manager, one barrel Purity Cheese Salt to the Cheesemaker securing the highest score on September white cheese, Class I, Sec. 1, Mary Morrison.

One barrel Purity Cheese Salt to the Cheesemaker securing the highest score on October colored cheese, Class II, Sec. 2, J. E. Stedelbauer.

One barrel Purity Dairy Salt to the Buttermaker securing the highest score on 56-lb. box creamery butter, Class III and IV, Sec. 1, Wm. Brown.

One barrel Purity Dairy Salt to the Buttermaker securing the highest score on 20 1-lb. creamery prints, Class III, Sec. 2, R. A. Thompson.

Note.—No special cheese required.

By the Imperial Bank of Canada, a Silver Cup, to become the property of the Cheesemaker securing the highest total score, three times, or twice in succession, on two cheese; one cheese either white or colored, exhibited in Class 1, and one cheese either white or colored exhibited in Class 2. In awarding this cup the scores of the two cheese securing the highest score in Classes 1 and 2 (belonging to the same exhibitor) will be added. In case of a tie settlement is to be left with the judges. J. E. Stedelbauer.

Note.—No special cheese required.

Cheese Buyer's Trophy—Challenge Cup, valued at $150, to become the property of the exhibitor of cheese at the Winter Dairy Exhibition who shall receive the highest score three times, or twice in succession. Mary Morrison, Newry.

Won 1903 by Frank Boyes; won 1904 by R. H. Green; won 1905 by O. Schweitzer; won 1906 by J. Patton; won 1907 by J. E. Stedelbauer; won 1908 by Mary Morrison; won 1909 by J. T. Donnelly.

THE CHAIRMAN: It has been thought well to ask a couple of the gentlemen who judged the butter and cheese to address you on the exhibit, and I think it is a good idea. You will be privileged to ask any questions of these gentlemen. You are here for the purpose of getting information along this line and do not let any opportunity go by to ask questions that will draw out something in this discussion. I will now ask Mr. I. W. Steinhoff, a man of wide experience in buying and judging butter and cheese and who was one of the judges of the butter at this exhibit, to address you.

I. W. STEINHOFF: I did not have an opportunity of attending the creamery meeting at Guelph, which is the best opportunity you can get for discussing the question with regard to butter making.

When I saw the exhibit of butter here I was well pleased with it. It is more creditable than anything I have ever yet seen, especially with regard to the October exhibit. I think I can claim to be the father of the introduction of that October exhibit. We had two objects in introducing it; one was to test the keeping quality of the butter or to give an opportunity of testing the keeping quality, and the other was to give creameries making butter in summer time an opportunity to exhibit at the Winter Exhibition. No exhibition that I have seen hitherto has been altogether encouraging. This is the first exhibit that I have really felt proud of and satisfied with, and that I think is entirely creditable to the butter makers of Western Ontario. (Applause).

I would like very much if some of the eastern men, the men from Montreal who are rather prejudiced against western-made creamery butter, could have had an opportunity of looking over this exhibit. There is not a discreditable piece of butter in that exhibit. It is of an even character and of good flavor, and is rather a surprise. I feel like asking Mr. Herns how he obtained such a good exhibit as he had this year.

You are probably aware that the weak point in the western creamery butter is the flavor. I think that, in a number of cases, the trouble is that the cream is not gathered often enough. One weak point is that heavy sort of old cream flavor. I think the instructors are doing good work along the line of improving

the cream, and I think more progress is being made in that direction, and this exhibit is an evidence of the improvement that has been made.

I want to get the names of every one of the thirteen exhibitors. There are still a great many of our good creameries that are not showing at this winter exhibition, and I think they should do so. I know Mr. Herns is doing all he can to encourage them.

I do not know that I have much of anything to say regarding the Print Butter Exhibit. I do not think it is of such a high order. One or two of the exhibits are not creditable. One has a very decided barn-yard flavor. The maker could not have been able to discover it, or he would not have sent it to the show.

The grass-made butter is the best. You cannot get the texture in the winter-made butter that you get in the grass-made butter. But I wish the creamery men advancement and success for the coming season, and I hope we will be able to see a more uniform article of better favor than we have ever seen before.

Mr. Robert Johnson: Being one of the judges appointed by your Association to judge your cheese, I have to congratulate you on the fine exhibit of cheese that we have had the pleasure of judging this year, and not only upon this but upon the large volume of entries and its fine quality. I can conscientiously say that I never judged or went through a finer lot of cheese than those at the exhibition here.

The judges on cheese have a very difficult task to perform, for the reason that the uniformity of product that you sent here to the exhibit is such that it places the judges in a very difficult position to determine between one cheese and the other. As regards the making up of the cheese, they are a credit to the cheesemakers of Western Ontario. The October cheese had a little of a starter flavor. It is not objectionable at all, and it disappears with age. I think it would be advisable that cheese for exhibition purposes should be forwarded to the destination, wherever our Show is going to be held, two or three days before they are opened up. Cheese coming in right off the express waggon we place on the shelves for judging, and it is pretty hard to give an impartial judgment on cheese of that kind, because they are cold and you cannot get the texture. I hope that will be remedied next year. Quite a lot of the cheese were without bandages, and I do not consider they are finished cheese unless they have bandages.. I do not think any exhibitor has a right to send a cheese here without a bandage. It is not a commercial product, because if I went into a factory and I found bandages off, I would not buy the cheese. I hope the boys will take this in good part, because we did not like to score the cheese down on that account; but wherever we found bandages off, we cut them a point on finish. I do not think you could get the same quantity of cheese of as fine quality as you have here on the American continent. I think you can thank your instructors a great deal for the uniformity of the product.

REPORT OF INSTRUCTION CHEESE FACTORIES WESTERN ONTARIO, 1909.

By Frank Herns, Chief Dairy Instructor and Sanitary Inspector, London.

It is with pleasure I present my third Annual Report of Instruction in Western Ontario. We have received the past season high prices for cheese, and the year has been a profitable one, particularly for the patrons. The work of instruction was carried on along practically the same lines as last year. Six Instructors were

employed for cheese factories, and two for creamery work. Before beginning the work of the season the Instructors spent a few days at the O.A.C., Guelph.

We made in Western Ontario 390 tons more cheese in 1908 than in 1907, or a total of 17,221 tons. The returns for 1909 are not in yet.

The Quality of the Cheese.—The quality was kept up and in many cases improved, particularly at factories where bitter or yeasty cheese flavor formerly prevailed. During the hot weather some open cheese were reported, but not so many as last year. We are endeavoring to overcome this defect so far as possible. A few complaints were made regarding mould. Some buyers object to cheese which are very mouldy. Where mould is prevalent I would suggest a thorough washing of the shelves, woodwork and floors of the curing room with a solution of corrosive sublimate in the proportion of 1 of corrosive sublimate to 1,000 parts of water, and then burn sulphur about once a week in the curing room with, if possible, considerable moisture present. This will very materially help to keep down the mould. The cheese from some individual factories were reported as going off flavor with age, due no doubt to several causes. I have reason to believe that one of the greatest defects we still have to contend with is off flavors. Very few acidy cheese were reported. During the hot weather some coarse textured cheese were noticed due to over-ripe and tainted milk and in a few cases to wrong methods of handling. The finish of the cheese is improving and less complaint was heard this year in the matter of boxing.

Late Fall Cheese.—We again wish to point out the fallacy of not making provision for curing the late fall cheese. Buyers again complained regarding the manner in which in some cases these cheese were handled. The percentage of factory men whose attention should be called to this matter may be small, but there are enough fall cheese neglected in this way to have considerable effect on the reputation of our November and later made cheese. The press rooms in some cases are not kept warm enough. The cheese after being taken from the press are placed in curing rooms the temperature of which goes far too low, and not sufficient care is taken to keep the cheese at an even temperature. Even after two weeks the cheese are not broken down, the color does not develop, the texture shows pasty, and the flavor in some cases seems to turn bitter. Cheese of this character do not by any means come up to the high standard expected of Western Ontario cheese, and it is to be hoped that next season makers who may be guilty of neglect in this connection will make a special effort to take proper care of the cheese and see that an even temperature of at least 60 degrees is maintained in the curing room until the cheese are broken down.

Quality of the Milk.—16,586 patrons sent milk to the cheese factories during 1909. This is 690 patrons more than in 1908. The average percentage of fat in the milk for the season was 3.52. (In 1908 it was 3.5.) For May, 3.3; June, 3.35; July, 3.4; August, 3.48; September, 3.65; October, 3.9.

The average loss of fat in the whey for the season was .227 per cent. (In 1908 it was .23 per cent.) For May, .215 per cent.; June, .211 per cent.; July, .211 per cent.; August, .241 per cent.; September, .245 per cent.; October, .241 per cent. It will be noticed that there is very little difference in the average loss of fat in the whey for the first three months and for the last three months. The greater loss from over-ripe and tainted milk no doubt comes after the curds are dipped.

Cooling the Milk.—There is no doubt that many patrons are improving in the care of the milk. More uniform methods are being adopted for cooling. Many,

however, have yet to put in proper facilities for cooling the milk during the hot weather. In some sections patrons who have never made any attempt to cool milk except by dipping or stirring have this year put in cement tanks large enough to hold the cans surrounded with cold water or ice. Some are putting up milk houses in which a tank is placed. There is still, however, enough tainted and over-ripe milk arriving at the factories in hot weather to cause trouble in making the finest cheese. In sections where cold water is plentiful there is no excuse for any patron sending over-ripe milk, when a little care will reduce the temperature of the milk sufficiently to insure arrival at the factory in good condition.

Had the aeration of milk without cooling accomplished all that was expected no doubt further experiments would not have been required, but it was fully recognized that the condition of the milk did not improve as rapidly as it should through the system of aeration. Hence the necessity for some simple, inexpensive system that would be more effective. The cooling of milk in tanks or tubs of cold water seems to meet the requirements, and I have yet to learn of a patron cooling the milk by placing the can in cold water without any attention being paid to aeration that the milk arrived at the factory in bad condition. In fact all reports that have come to us are quite satisfactory, and bids fair where practiced, to make a rapid improvement in the milk supply.

Pasteurization of Whey.—Had the old system of handling whey met the difficulties of the whey question, or was no whey returned in the cans, then the pasteurization of whey might not have been necessary; but it must be admitted by everyone that these conditions were not met. Pasteurization of whey eliminates so many abuses at a small cost that the results far outweigh any objections to the system. Cleaning tanks in the ordinary way did not get rid of bitter flavor, neither did the leaving of them without cleaning do so. Allowing the fat to rise to the top and the whey to become very sour did not put the whey in the best condition for feeding. Allowing the whey tanks to become filthy and ill-smelling was not improving our milk supply; therefore a system which when properly practised overcomes many of these conditions must have an uplifting effect. I have yet to learn of a factory adopting pasteurization and doing the work properly that has not had good results. Many factories troubled with bitter flavor for years are now practically free of it.

94 factories pasteurized the whey this year. 22 factories fed the whey at the factory, leaving 95 factories out of 211 not pasteurizing the whey. The average percentage of fat in the whey returned in the patron's cans pasteurized was .204. The average percentage of fat in the whey returned in the patrons' cans when not pasteurized was .1. The average acidity of the whey returned in the patrons' cans pasteurized was .37 per cent. The average acidity of the whey returned in the patrons' cans not pasteurized was 1.2 per cent. These figures are practically the same as last year. The average length of time required to heat the whey to 155 degrees was 1.49 hours. The average time the whey remained above 150 degrees was 2.4 hours. At a few factories they did not do a first-class job in the pasteurization of the whey. Several reasons might be mentioned. Some factories are not yet properly equipped for this work. The boilers are too small, tanks too far from the factories, water supply short, and insufficient attention paid to the general conditions necessary for proper results. However, the majority of the factories have done the work well, and the patrons seem to be well satisfied and quite willing to pay their share of the cost of pasteurization. The patrons should in all cases pay the cost, and I wish to point out that when makers receive pay for

the work they should in every case use their best efforts to see that the very best possible work is performed.

Septic Tanks.—Another difficulty met with, particularly in the early part of the season, was that at some factories a great deal of whey was left over from day to day. This surplus whey became sour and acted as a starter in the fresh whey, making it difficult for the factory men to do good work as they had no way of disposing of this surplus whey. We would strongly urge that the patrons co-operate with the maker in emptying the tank each morning during the early part of the season, so that only fresh whey will be in the tank from day to day. Also that later in the season when the whey is short only each patron's share be taken. The most satisfactory method is to have a man measure out the whey. A number of factories have adopted this system. Another difficulty came about through the common practice of allowing the wash water to go into the tank. This not only had a tendency in some cases to contaminate the whey after it was pasteurized, but also diluted the whey, and made an accumulation difficult to dispose of until the latter part of the season, when the whey began to get short. Some of the factories, seeing this difficulty, began to put in septic tanks or other means of disposing of this wash water. Some factories were already in a position to handle the wash water. Factories which have put in septic tanks large enough to handle the wash water are having good results, and I would strongly urge factories intending to put in septic tanks to be sure they are large enough. It is better to have them too large than too small. Small septic tanks fill up with sediment, and have to be frequently cleaned, while the large tank works better and needs cleaning only at the end of the season. I would suggest a tank for an average factory to be 12 to 15 feet long, 6 ft. wide, 5 ft. deep, with 3 compartments.

Cost of Pasteurization.—The pasteurization of whey has got beyond the experimental stage, has given excellent results where properly done and the cost will not exceed $1.00 per ton of cheese. Experimental work was done during the early part of the season in both Eastern and Western Ontario regarding the cost of pasteurizing whey, the results of which work will no doubt be published in some form later on.

Whey Butter.—Only eight factories in Western Ontario made butter from whey the past season.

Rennet.—Considerable work was done by the Instructors relating to the efficiency and strength of the different brands of rennet extract in use the past year. The results of this work will probably be made known later on.

Whey Tanks.—Our whey tanks are in much better shape this year, many new ones having been put in, particularly elevated tanks which have replaced the old worn-out ground tanks. The few steel tanks in use are giving the best of satisfaction, are easily kept clean and give every evidence of lasting for years. Cement tanks are not in the majority of cases giving good satisfaction, and I do not think it adisable to put in these tanks as the whey seems to dissolve the cement face and as soon as the rough surface is exposed all kind of trouble begins. There are, however, some whey tanks not kept clean. This is to be regretted, for there is no doubt that unclean whey tanks have a detrimental effect on the flavor of the cheese. We trust that next season a special effort will be put forth to keep these tanks in good condition.

Sanitary Condition of the Factories and Improvements.—$30,448 were spent this year by the factorymen in putting their plants and equipment in better condition, eight new factories were built at a cost of about $18,200, making a

total $49,748 spent on our factories this year, 61 of which are Joint Stock or Co-operative factories, and 144 owned by private individuals. The sanitary conditions of our factories are steadily improving as fast as the owners can afford to spend money for these improvements. Most factories now have cement floors. Many are attending to the drainage and general surroundings. Some, however, are not in as good condition nor kept as clean and tidy as they should be. They lack that system in the daily work, and the neat appearance that makes the patron, the maker, and everyone else proud of the factory. Some factories will need considerable repair in the matter of floors, equipment, and several other ways before opening up next season.

Cool Curing.—21 factories have cool curing rooms, 8 more than last year. Some of these were not supplied with ice the past season, but the rooms have been insulated and put in shape to receive ice to control the temperature. We hear of several other cool curing-rooms likely to be installed this winter ready for next year's operations. Patrons are each year beginning to realize the necessity for cool curing along with cool milk, and are in some cases quite willing to assist the makers in erecting modern cool rooms. They are beginning to see the folly of making fine cheese, and then putting them in curing-rooms the temperature of which cannot be controlled with the result that the cheese are inferior when inspected, although they might have been finest when made and would have continued so had they not been heated. It is quite evident that had the money spent in past years in many cases on substitutes for insulation, such as sub-earth ducts, ice boxes, fans and so on, been spent in insulation, our curing-rooms would have been in far better shape to-day. However, we are beginning to realize that nothing will take the place of insulation if we expect to control the temperature in our curing-rooms.

The Culture.—188 factories are now using a pasteurized culture. This is a great improvement over the old ordinary milk starter or none at all. The makers are each year becoming more familiar with pasteurized cultures and are using good judgment in handling them. We wish, however, to mention here that it is just possible that some makers may get a little careless at times in handling this culture, allowing it to become over-ripe and of poor flavor. If such culture is introduced in the milk, the result will certainly be off-flavored cheese, perhaps not showing at the time of shipment, but in the buyer's hands later on if the cheese are held. The Instructors do their best to keep these cultures in proper shape, but if they are neglected in any way by the maker and become off-flavored, they will sow the seeds which may cause off-flavor in many cheese before the Instructor can make his regular visit and discover the difficulty. I would urge the makers to pay particular attention to the cultures. As soon as signs of off-flavor are observed secure another. Cultures with an acidity of from .7 to .75 per cent. are in the best condition for use and for propagation from day to day. All utensils which come in contact with the culture should be thoroughly sterilized, as it is useless to pasteurize the milk for a culture and then allow it to become contaminated by coming in contact with unsterilized utensils. Dippers with holes in the handles, wooden paddles, or anything but a wire handled solid dipper should never be used for stirring a culture. The thermometer should be sterilized by dipping in boiling water before coming in contact with the culture.

Alkaline Solution.—189 factories are using the acidimeter. The system followed the past season of having the Instructors make most of the solution as they pass from factory to factory seems to have given satisfaction, and very little

complaint has been received this year regarding solution not uniform in strength. Many of the makers made their own solution after securing a supply of correct standard acid. The Instructors were supplied with standard acid of proper strength by the Chemical Laboratory at the Ontario Agricultural College, thus insuring the standard acid would all come from the same source. I would like to express thanks to the Chemical Laboratory for supplying us with this standard acid. I might here mention that I think it would be a good plan for the makers, particularly the younger makers, not to entirely discard the hot iron or rennet test but use them occasionally along with the acidimeter and keep perfectly familiar with these tests as they come in very handy at times.

Deterioration of Milk.—45 cases of deterioration of milk were reported by the Instructors, these were looked after by the special officer appointed for this work, and fines ranging from $5 to $50 were imposed. Three cases were defended, but conviction was secured. One case was appealed by the patron from the Magistrate's decision before a County Judge. The Magistrate's conviction was sustained, the patron paying the cost of appeal.

Meetings.—District meetings were held during November and December in the different groups, where many points of interest to the industry were discussed. Some of these meetings were well attended, others were not. Since January 1st, 1909, to Oct. 31st, 1909, 145 annual and district meetings were attended by the Instructors or myself, with a total attendance of 10,057. The 16 district meetings held during the month of February, attended by Mr. Geo. H. Barr, who gave his illustrated address on "The Care of Milk," and Mr. Jos. Burgess, who spoke on "Cow Testing Associations," were very well attended, and did a great deal of good.

There are 205 cheese factories in the six groups, five more than last year, with 6 outside factories, making a total of 211 cheese factories. There were 602 full day visits, 565 call visits, making a total of 1,173 total visits to the factories. There were 934 curd tests made, and 522 of these samples were tainted. 310 patrons were visited, 2,441 new milk cans bought, 35,494 lactometer tests made, 1,101 Babcock tests made for adulteration, 1,176 Babcock tests were made other than for adulteration, 636 Babcock tests were made for loss of fat in the whey. 23 factories are paying by the test, the same number as last year.

Quarter Inch Wire Curd Knife.—The majority of factory men now use the one-quarter inch perpendicular wire knife, with a three-eighth inch ordinary horizontal knife, which are giving good satisfaction. Curds usually have only to be cut once with the three-eighth inch horizontal, and twice with the one-quarter inch perpendicular wire knife. This gives us cubes one-quarter inch by three-eighth inch, which are easily firmed, even with fairly fast working milk without rough handling, and insures under the average conditions a curd thoroughly firmed before sufficient acid has developed for dipping. With the old style coarse knives the curd often had to be cut several times to get it fine enough to be able to secure sufficient firmness, particularly if the milk was working fast, thus causing a loss of cheese solids, and in many cases the curds retain excessive moisture resulting in acidy cheese. The one-quarter inch knife has not only very materially lessened the number of acidy cheese, but has also helped to improve the texture.

We wish, however, to point out that in some cases when the wires become broken they are not replaced soon enough, and through this neglect the curd cannot be cut uniformly, bringing about conditions that are likely to result in open cheese. We would suggest that the makers keep on hand some wire necessary for repairing these knives, and immediately a wire breaks it be replaced with a new one if best results are to be expected from the use of the wire curd knife.

REPORT OF INSTRUCTION IN CHEESE FACTORIES, WESTERN ONTARIO. 1909.

Group and Instructors.	No. of factories.	No. of patrons.	Tons of cheese, 1908.	No. of visits.	No. of call visits.	No. of curd tests.	No. of samples tainted.	No. of lactometer tests.	No. Babcock tests for adulteration.	Patrons visited.	No. of new cans bought.	No. factories pasteurizing whey.	No. of factories making whey butter.	No. of factories paying by test.	No. of factories cool curing room.	Average per cent. fat in milk for season.	Loss of fat in whey for season.	New factories.	Cost of new factories.	Other expenditure.
																			$	$ c.
Stratford—																				
Alex. McKay	36	3,103	3,752	118	83	268	188	4,612	121	58	542	17	.....	9	9	3.6	.236	....	.....	8,897 50
Listowel—																				
Jas. R. Burgess	36	3,350	2,552	94	75	59	13	8,129	115	26	453	11	.....	5	4	3.6	.21	1	5,000	2,449 50
Ingersoll & Woodstock—																				
E. N. Hart	36	2,056	4,115	107	105	209	152	4,400	51	90	120	21	.....		5	3 5	.24	. ..	.....	9,714 00
Simcoe—																				
Geo. Travis	31	2,789	2,472	80	117	108	67	6,241	489	30	449	8	4	....	1	3.5	.22	....	.....	3,630 00
Brantford—																				
R. H. Green	28	2,515	1,755	100	107	243	67	6,214	155	81	332	16	2	2	1	3 45	22	1	2,000	3,500 00
London—																				
A. E. Gracey	39	2,872	2,395	103	72	56	35	5,888	170	25	545	21	2	2	1	3.58	.235	5	12,500	2,257 00
Outside Factories—																				
F. Herns	6	.....	.....	6	....	....	....	.....	.....	....	.....	.....	.....	....	.....	.....	.....	....	.....	.....
Total	211	16,685	17,041	608	559	945	522	35,484	1,101	310	2,441	94	8	22	21	3.55	,227	7	19,500	30,448 00

A number of samples of curd and cheese were sent by the Instructors to the Dairy department of the Ontario Agricultural College for moisture determination. Also samples of whey to the Bacteriological department, the results of which work will no doubt be mentioned in addresses given at this Convention. Samples of milk, curd and cheese were sent to the chemical department for analysis to endeavor to find out when and how the loss from over-ripe milk takes place and to what extent. No doubt this work will be continued again this year.

Conclusion.—The Instructors have put forth their best efforts to make the past season a success. I appreciate very much indeed the loyal, kindly feeling which the Instructors have ever shown towards me.

The Board of Directors, the Instructors, and myself have worked in perfect harmony and in a spirit of co-operation.

My sincere thanks are given to the Directors and the members of the various Committees for their hearty support. My thanks are tendered to the cheese and butter makers, factory men and buyers for their kindness to the Instructors and myself, and the assistance they have given us.

A STUDY OF YEASTS IN WHEY.

By S. F. Edwards, O. A. C., Guelph.

I would like to say a word in explanation of the title of my paper. The origin of the work which we have done so far at the College was a conversation with Mr. Herns with regard to the off flavors which unfortunately we sometimes get in cheese, and as to the cause of some of those off flavors. During the fall Mr. Herns asked me for a title of what I would say to you at this time, and at that time we did not know exactly how our results were coming out, and I told him to make it "A Study of Yeasts in Whey." The real subject matter is the question of the influence of yeasts found in whey on the flavor of cheese.

The question of abnormal flavors in butter and cheese is fraught with interest to every commercial dairyman, for upon the flavor depends very largely the salability of the product.

Texture, keeping quality, etc., are important, but what the discriminating consumer pays for is palatability, and he is willing to pay a price commensurate with the appeal which the flavor makes to his palate. If the maker, then, can maintain or increase the desirability of the flavor of his product, be it butter or cheese, he is in a fair way to realize a better profit for his labor than the man who gives little or no attention to this important point.

Flavor in milk, butter, and cheese is due very largely to microscopic organisms, yeasts, molds, and bacteria, or indirectly, to the products formed by these organisms in their growth.

Some of these species of organisms are essential. Without the lactic acid bacteria the ripening of cream would be impossible. The lactic acid bacteria are valuable friends also in the souring of milk in the household, thus, to the popular mind, rendering it unpalatable before the putrefactive bacteria which are almost certain to be present, and which are far more harmful to the body, have time to develop. Roquefort, Stilton, and Gorgonzola cheese depend for their piquant flavor upon the growth of mold in their interior.

The clean flavor of cheddar cheese is believed at the present time to be due partly to the action of the enzymes or ferments present in cow's milk, and in the rennet used, and partly to the lactic acid bacteria which are always present. Aside

from this clean, desirable flavor, there are at times special flavors, usually undesirable, and which to the best of our present knowledge may be largely at least accounted for on the basis of growth in the cheese of micro-organisms getting into the milk from various sources, and passing on into the cheese.

One of these special flavors is the so-called sweet or fruity flavor, a condition of cheese which is widespread through the Province of Ontario, and causes great annual loss. The need of exact knowledge on so important a point is evident. What the successful cheesemaker must have is a clear understanding of the causes which produce the most desirable flavor and of the treatment essential to maintain the proper conditions for securing that end. It is no less important that he should know the causes producing the objectionable flavors which occasionally appear, and methods for combatting the agents producing them. It was with a view of throwing some light upon this problem that the present investigation was undertaken. Though some results have been secured, much work remains to be done, and this paper should be considered as only a preliminary report of results obtained up to this time.

In considering the possibilities of the problem, the most probable causal agents of this off flavor were the yeasts, and our investigation has been confined entirely to these organisms.

Various investigators in studying the bacterial flora of cheese, have given the yeasts consideration only incidentally, and few have seemed to give them serious consideration in their relation to hard cheese other than a possible role in gas production. Russell and Weinzirl, in a report on the flora of six cheddar cheeses, mention yeasts only once, and in that case a bad odor had been noticed in the curd.

Weinzirl reported the results of examinations from 50 cheddar cheese from factories scattered through seven states and from Canada, and in only four cheeses were yeasts found.

In a study of the rolé of organisms in the ripening of cheese, Harrison, in 1900, found yeasts quite commonly present in Canadian cheddar cheese, and frequently in large numbers, although he does not appear to have considered them of special significance.

I have been able to find record thus far of the work of but one investigator on the direct problem of sweet flavor or fruity flavor in cheese. Harding, of the Geneva, N.Y., Experiment Station, in 1899 examined samples selected by cheese experts as showing fruity flavor, coming from thirteen factories in New York, besides several samples of unknown origin from commission men, and found yeasts present in considerable numbers in every cheese, ranging from 1 to 50 per cent. of the total flora. (Estimated.) Harding used starters of one yeast, isolated from a cheese showing a well marked case of sweet flavor, and succeeded in reproducing the flavor. His conclusions were: "Sweet flavor includes a group of undesirable cheese flavors. Clean flavored cheese contains few yeasts, while sweet flavored cheese contains large numbers of yeasts at least during the first stage of ripening."

The source of the yeasts studied in the present investigation was samples of whey sent by the cheese instructors in the round of their visits to the factories of Western Ontario.

Methods of Securing the Samples: The first containers prepared for shipping the samples were strong wooden boxes, lined with galvanized steel, and designed to hold a quart milk bottle or fruit jar surrounded with ice. These boxes were heavy and cumbersome and proved unsuitable for the purpose. The next method tried was the use of quart Thermos bottles. These were small and easily handled, and previous laboratory tests had showed that they were effective

in keeping the temperature at a low point. In the first shipment of samples, the inner casings of two bottles were broken. This promised to be a very expensive method of securing samples, and it was discontinued.

It was now argued that inasmuch as the yeasts in the whey were the only organisms to be studied, and that the analysis was to be only a qualitative and not a quantitative one, that the troublesome species at least would survive until the samples could reach the laboratory even if they were not kept cold. Hence we adopted the method of having the samples sent in 2 oz. sterile bottles supplied by the laboratory. These could be sent by mail in paper mailing cases, and all the subsequent samples were handled in this manner.

Upon arrival at the laboratory the samples were plated in whey peptone beef extract gelatine, a medium which was found very suitable for the growth of yeasts, although it did not entirely inhibit the growth of other organisms. The plate cultures were incubated at a suitable temperature until all growth ceased, when colonies were isolated onto ale wort gelatin and retained for further study. In this way 25 samples from 25 different factories were plated, and from the plates from these samples a total of 79 yeast-like colonies were isolated. As would be supposed, duplicates were found in the samples from different factories. By comparative cultural methods the duplicates were weeded out until there remained 12 distinct species, upon which further study was made and which is still in progress. These 12 yeasts may be held to be representative of the yeasts distributed throughout the western Ontario district at the present time.

Action on Sugars.—The action of the yeasts on various sugars was determined as follows: A watery extract of ale yeast was prepared and to portions of this yeast water were added respectively the following sugars: Dextrose (grape sugar), lactose (milk sugar), maltose (malt sugar), saccharose (cane sugar), glycerine, and mannite. These sugar solutions were filled into fermentation tubes, sterilized, and inoculated with the yeasts. Fermentation tubes of fresh milk and of ale wort were also used in the test.

The results are shown in the following table:

Cultures incubated 90 hours, 25° C.

—	Yeast water.							
	Dextrose.	Lactose.	Maltose.	Saccharose.	Glycerine.	Mannite.	Milk.	Ale wort.
A2								
A5		* 45%					* 30%	
B2	* 25%							
B4	* 25%			* 95%				
D1	* 30%							
J1	* 90%	* 50%		* 100%			* 40%	
J2	* 98%							
K1	* 75%		98%	* 60%				* 80%
K3	* 5%			* 40%				* 75%
O1	* 20%						* 8%	* 70%
P1	* 55%	* 40%		* 40%			* 90%	
X2								

*Indicate gas produced. Blanks indicate no gas produced.

Thus 9 yeasts fermented dextrose, 3 fermented lactose (in yeast water), 1 fermented maltose (in yeast water), 5 fermented cane sugar, 4 fermented milk, 3 fermented ale wort, and 2 did not ferment any of the sugars. The particular significance to the dairyman in these results lies in the number of yeasts able to produce gas in milk. Gas production in milk and cheese is often caused by bacteria, but these results agree with those of other workers in showing that gas may also be produced by yeasts present. In this connection it may be stated that in many samples of gassy milk and cheese received at our laboratory for analysis in the last few years, the gassy troubles were caused by yeasts.

Action in Milk.—The effect of these yeasts in milk was examined in the following manner: Small flasks of skim milk were sterilized in steam, inoculated with the yeasts and incubated at room temperature. The cultures were examined at the end of four days, and their condition may be summarized as follows:

A 2—No odor, marked acrid flavor with slight astringent "after taste."

A 5—Pleasant yeasty odor, marked alcoholic taste.

B 2—No odor, very slight astringent taste.

B 4—Milk coagulated and partly digested. Supernatant fluid muddy. Very bad putrefactive odor. Not tasted.

D 1—No noticeable odor. Slightly astringent taste.

K 1—No odor, marked bitter flavor, especially the "after taste."

K 3—Slight yeasty odor, no marked flavor.

J 1—Pleasant yeasty odor, slight yeasty flavor.

J 2—Slight yeasty odor and very slight alcoholic flavor.

O 1—No marked odor, slightly acrid flavor.

P 1—Very soft curd formed with digestion beginning, slight yeasty odor, and yeasty flavor.

X 2—No marked odor or flavor.

Flask Cultures of the yeast in milk were also examined after 25 days, the results being summarized as follows:

A 2—Casein completely digested, sour odor.

A 5—Strong yeasty odor.

B 2—No apparent change. Strong bitter taste. Slight putrefactive odor.

B 4—Casein completely digested. Strong fecal odor.

D 1—Casein completely digested and slimy. Sour odor, like the off flavor found in curd.

J 1—Strong odor of beer.

J 2—Pinkish color on surface of milk. No marked odor.

K 1—Partly digested. Rancid butter odor.

K 3—No apparent change. Barnyard odor.

O 1—Soft coagulation of casein, strong yeasty odor.

P 1—Casein completely digested, marked pineapple odor. Also alcoholic odor. Characterized by Mr. McKay as a typical sour whey tank odor.

X 2—Culture lost.

The Dairy department of the College kindly agreed to make some cheese incorporating cultures of yeast into the milk. Cultures of three species were prepared, and on Dec. 15th Mr. Ralph made the cheese. His notes follow in full:

11 cheese were made Dec. 15th, 1909.

D 1—Good bodied curd. Flavor fair. Did not consider curd anything out of the ordinary.

K 3—Very bad curd. Decided strong barnyard flavor.

A 5—Fair curd. Flavor quite passable but not clean. Lactic acid did not work so fast on this curd.

Cheese judged Jan. 7, 1910.

D 1—Weak body. Flavor not clean.

K 3—Pronounced yeast flavor.

A 5—Rank flavor similar to flavor produced from rusty cans.

Cheese were made under ordinary conditions the same as in the factories. Cultures were put in the night before and curds worked a little fast. On A 5 the acid did not develop so fast. Used 140 lbs. of milk to each cheese, cured at temperature of about 60 deg. to 65 deg."

We hope to carry our study of these three cheeses further, and also to have more cheese made using the other yeasts in the starter.

If we admit that these yeasts are able to cause off flavors in cheese, the main point of interest to the cheesemaker is how they can be destroyed. Only one set of tests have thus far been made to determine the temperature at which they are killed, and this showed that of the 12 species, 5 were destroyed when subjected to a temperature of 144 deg. Fah. for 5 minutes, and 3 of the remainder were killed between 10 and 15 minutes at the same temperature. Some individuals of the other 4 species remained alive after 35 minutes at 144 deg.

Before making the application of these results to the cheese industry, it would be pertinent to give attention to the origin of these organisms, and their method of distribution. I have continued to speak of them in this paper as yeasts, and although our work on the determination of the species is not yet finished, I believe that some, perhaps all, are not true yeasts, but are species known as torulæ or so-called wild yeasts. These wild yeasts are widely distributed in nature, having been found in soil, on green and ripening fruits, and the leaves of trees. We frequently find yeasts developing in culture plates exposed to outside air and in dairy stables. Suppose one of the obnoxious species of yeast was present upon the farm of Mr. A., a patron of the cheese factory. We can readily conceive how it might get into his milk, and multiply rapidly there in the few hours that elapsed before it reached the factory. During the process of manufacture the yeast from his farm would find its way into the whey tanks, where it has excellent conditions for continuing to multiply and permeate the whole tank of whey. On the following day this whey is drawn off, and goes out, not to A.'s farm only, but to B., C., and so on round the neighborhood. If all the patrons of the factory scald their cans thoroughly enough to kill the yeasts, the epidemic is stopped, if not, and there are always some who do not scald the cans thoroughly, the yeasts on each farm multiply in the milk when put into the cans over night and go to the factory in vastly increased numbers, and the maker's troubles are multiplied accordingly.

The remedy is obvious. Kill off the yeasts from A.'s farm before they are distributed to the cans of all the other patrons of the factory. Our laboratory work thus far has shown that 8 species and most of the individual yeasts of 4 other species are killed in a short time at a comparatively low temperature. Pasteurization of the whey at the factory, before it goes into the patron's cans, is a sure and satisfactory way of combatting these troublesome micro-organisms.

Conclusions: Twenty-five samples of unpasteurized whey from 25 factories in Western Ontario were examined and 12 distinct yeast species were isolated.

All of these yeasts when grown in milk produced a bad flavor.

Three species used as starters for cheese are producing bad flavor in the cheese after curing 25 days.

Sixty-six per cent. of the species isolated are killed in ten or fifteen minutes at a temperature of 144 deg. Fah.

It is believed that pasteurization of whey at the factory is a remedy in most cases at least for off flavors in cheese caused by yeasts.

ADDRESS.

By G. G. Publow, Kingston.

I am sure that it is with great pleasure that I meet with the dairymen of Western Ontario. It is some six years since I had the pleasure of being here, and I have felt it is my loss not to be with you. We do not forget that while we live in the east and you are in the west that we are in partnership. We cannot get away from that fact. Anything that you may do to cause a loss to the dairy business affects us. If we do anything in the east that would tend to lessen the value of our cheese or butter or increase the yield of milk to make a pound of cheese, it is felt by you.

I would like first to express my appreciation of the splendid exhibit of cheese and butter you have downstairs. I never saw at your Western Convention so fine an exhibit as you have of both cheese and butter. I had the pleasure of going through them last night, and they certainly are a credit to the western part of Ontario. In fact I never saw a better lot of cheese and butter on exhibition as what you have at the present time, and Mr. Herns is to be congratulated on having such an excellent exhibit. I would draw your attention to the fact that a lady cheesemaker has topped the prize list again, which goes to show that we probably should encourage the feminine line of labor in our cheese factories. I would like to find out how it is that she trimmed both the western and eastern makers at the exhibitions.

I am down for some problems on cheese and butter making. In looking over your exhibit I find that you have the same problems to contend with that we have in the east. In eastern Ontario I have 950 factories under my charge and 28 creameries. I have 25 instructors. One of our problems is that of small factories. We have a great many very small factories, that are cheaply constructed and poorly manned. We also have in the east the problem of small production. We have made a special effort for over two years to find out what the actual yield per cow is for six months. Last year, the yield shown, according to the secretary's report, was 2,700 pounds of milk per cow from May until the 1st of November. And this year we find it is about 163 pounds greater than last year for the six months. We have another problem, and that is the yield of cheese per pound of milk. Our people think it is too high, and in the face of all our dairy education and instruction work, it is creeping up and creeping up, taking a little more milk for us to make a pound of cheese.

We found this year, the same as last, that our milk averaged 3.6 fat, and the yield of cheese per 100 pounds of milk was 10.6, practically just the same as last year. We are not getting the yield of cheese per pound of fat that in our factory practice with reasonable careful work we should get.

The problem, perhaps, with which we are most concerned, and that which will apply equally in the west as in the east, is that of flavor. The most difficult problem we have is to get a good flavor in all our cheese, and then there is the openness of make. In looking over your excellent exhibit last night, there is plenty of evidence that you have the same conditions here in the west. We have tried many ways of overcoming this. We find pasteurizing very beneficial, particularly in getting rid of the fruity flavors. That can be practically overcome by pasteurizing, but still we have defects in our flavors.

It seems to me that we have neglected the farm side of this work, and the problem with us is how are we best going to get the farmers to take an active interest

in this matter. The practical cheese maker will readily admit that the quality of the cheese largely depends on the quality of the raw material. No matter how good your factory may be, or how skilled you may be in the manufacture of cheese and butter, it is impossible to make the finished product if you have not the raw material. In the east we have some very good factories, but notwithstanding that we have defects in the cheese made in these factories, and notwithstanding the fact that it is made by first-class men.

This year we had five Instructors do some special work. We took one of our best factories, and one of our poorest factories, and three average factories. In one factory, on August 7th, we had occasion to send an Instructor. This factory was above the average, manned by a first-class maker, and yet their cheese was being faulted and a claim of one-half cent a pound made on the cheese. We sent an instructor to make an investigation. He took in the milk. They accepted 12,252 pounds and rejected about 500 pounds. The milk tested 3.5 per cent. fat. The temperature of the milk they received in the vat was 83 degrees on that day, and it took 11.51 pounds of milk to make a pound of cheese. The instructor spent two days amongst the patrons of that factory, visiting the farms of the patrons who sent milk overripe and in a tainted condition. On August 11, he went back and made the cheese. He took in 12,700 pounds of milk and there was no milk rejected that day. The average fat was 3.5. The temperature of the milk received was 74 degrees, and it took 10.86 pounds of milk to make a pound of cheese from milk testing the same percentage of fat and made by the same man, and they had an increased yield of cheese of 67 pounds.

Q.—How much was the average in the first place with a temperature of 83°?

A.—11.51°.

That thing is taking place all over our country. Is there anything that can be done in our work that would pay the farmers better than giving their milk sufficient care? ? If we could get the milk delivered to the cheese factory in as good condition as our best patrons are delivering it, it would take at least one-half pound less milk to make a pound of cheese and that would mean over one-half million dollars in our factories each month. And that is a low estimate. Have we as cheesemakers done our duty? Have we put forth the effort that we really should, or are we responsible to any extent for what is taking place?

I believe, in the east, in many cases, where we have keen competition, the makers are taking in milk that they should not, and when we visit the farms they say, "The makers never said anything to us about this and they never sent any of our milk back." The extra care given to sanitary conditions, and the fuller attention given to proper methods of cooling the milk would have made a saving of 67 pounds of cheese in one day in a certain factory, and half a cent a pound added to the price because there was no claim made against the cheese, and that would make in that factory a profit for one day of $11.

Is it worth while setting our energies to the farm side of the question? The fact of the milk being in proper condition increased the yield and overcame the defects in quality, and it is quite evident to me that what caused the one was responsible for the other. Not only will we increase the yield in cheese, but we will overcome the defects that we have to contend with, and I am satisfied no money can be better expended than in reaching the farm side of dairying in this Province.

Q.—Counting the loss in cheese and cutting down the yield would mean a loss of $1,125,000?

A.—Yes. It was mentioned to-day about the cow's mouth watering for the ensilage, and we want the people's mouths to water for the cheese. It has been said that the flavor is the most essential thing in that respect. If people do not like the flavor of our cheese, then we want to make our dairy products attractive to the taste of the consumer. I believe if all the cheese made in Eastern Ontario had been of as good flavor as the best of our cheese, we would have gotten one-half cent per lb. more than we did. Should not that be sufficient to induce the farmers to take more care of their milk? We find that our cheesemakers are putting forth a special effort to become well qualified to do their work in the average factory, and the factory men are doing good work. We find that even our best makers, with the best factories, are having the same difficulties as the men in the poor factories, owing to the condition of the raw material.

I would like to see a special campaign made on the farm side of dairying. Get the people to do what is really necessary to enable us to give them a pound of cheese and as much as they should get from their milk. We may spend thousands and thousands of dollars in instructing cheesemakers and trying to get the cheese factories in a sanitary condition, and with but little advantage. I am sure that you have in the west spent as much money as your business would warrant in getting your factories in good condition. Probably not more than 200 cheese factories can be faulted in Eastern Ontario in connection with their sanitary condition. Many of them are cheaply constructed, but yet the buildings are clean. They have good water supply and underdraining.

In visiting the farms, we found the great majority of people were milking in the stable, and no special attention was given to sanitary conditions. Many of the cows were kept in unsanitary places, and very little attention was given to the cooling of milk. They put it into the can, stirred it a little and left it there, and when we found any fault, they say, "We have kept it there for twenty years, and have milked the cows in the same place, and never had any fault found with the milk." They will throw that up to you every time. We were told this morning in that excellent address how yeasts are spread all over the country, and we cannot find many factories in Eastern Ontario but where we will get that bitter flavor. We have the "billy-goat" flavor and the "fruity" flavor, which are easily overcome; but the bitterness in the taste is very difficult to overcome. You get it in nearly every factory in Eastern Ontario and there are very few of the cheese on exhibition here that have not got it to a greater or less extent. Some of them are perfectly made, but the flavor is bitter.

It is evident to me that the makers in the west are doing their work well. I never saw a finer lot of textured cheese on exhibition. They are smooth and silky and reasonably close boring. But your highest scoring cheese are off in flavor and that should impress upon you the need of having the milk cleaner and better cared for. No matter what we do in the way of cooling the milk and getting it delivered to the factory apparently sweet, the temperature is such that it is favorable for growth of fermentation and after the cheese are made, the flavor develops.

We have not laid sufficient stress on the sanitary conditions of our stables and the cattle. From observations in visiting the farms we came to the conclusion that the cow herself is the greatest source of infection. There is not enough care given to them and the places where the milk is kept are not proper, the whey tanks have been allowed to become in very unsanitary conditions. Our people, evidently, do not see the necessity of thoroughly scalding their cans from day to day. In a large number of cases we have found the people washing the cans with cloths and then they leave the cloths hanging on the stand or on trees or on fence posts, and they use these cloths for washing the next day.

The question comes to us: how are we going to get the makers to use their influence with the patrons to have this milk delivered in better condition? I believe the makers should be more honest with their patrons, and when the milk comes to the factory out of condition they should return it at once. I would ask you to place before them that partnership business, so that they will all work together to help along this cheese business. I am sure that there is not one factory in Western Ontario but what has more or less of the patrons delivering milk in first-class condition. And if all the milk were as good as that, it would take less milk to make a pound of cheese and the cheese would be better.

There never was a time in the history of Canada when we should put forth a greater effort to improve the quality of our product. The cry from the Old Country regarding our cheese is that we want them a little meatier. Our cheese are going to the market at an earlier date than they used to. They want them riper, showing a more meaty texture than they did a few years ago. It will not be safe for the cheese-makers of this country to make them much meatier until they get a better milk supply. You know as practical men that the more moisture we have in cheese, the greater the fermentation is, and it will not be safe for us to make them much softer than we are doing at the present time until we get better raw material. I believe, as I said before, that we can make for the people of this country a million and a half dollars by simply improving the sanitary conditions surrounding our factories, in the better care and production of our milk and the cooling of the milk to suitable temperature. Is it worth while? Are we going to go from year to year trying to find methods to overcome defects? Have we not gone far enough to know that it could not be done at the factory, and when we have learned that, have we not got wisdom enough to direct our energies to where it can be done to better advantage and at less expense? Now just so long as we continue in our present methods, so long will we have our common defects, and just so long will the people of this country who are producing the milk suffer the losses that are going on from year to year.

Q. You talk about whitewashing stables and all that; cleanliness at the start is the foundation of the milk business?

A. Yes, I am satisfied, myself, as to what is the cause of the loss. We have found in many curds that it took thirteen pounds to make a pound of cheese, and we have found when we had such a loss that our curds softened out, and whenever we had this we had very heavy loss due to the breaking down of the casein. Probably the bacteriologists can tell us why it is. When we found that condition of the milk, we always had an over-ripe milk and the inspection made at the farm showed less attention had been given to cleanliness in every way. I will say this to you, that in practically every case where we pasteurized the whey that defect was overcome.

Q. How many days intervened between these two tests?

A. Three days. There was only two degrees difference in the temperature of the atmosphere and it was entirely due to the people cooling their milk. Where the whey was not returned, we had less trouble with flavors and got a better supply. I could not say whether there was any difference in the yield or not. The less stirring you do in the cooling the better.

Q. By running over the aerator or stirring in the can, which do you recommend?

A. If you have a dusty place, and the atmosphere is not very good, you had better keep it in the can and cool it and stir it around. If you had an aerator covered it would be all right to run it over the aerator.

Q. Why lay stress on a cool curing room, when the cheese is moved out within two or there days after it is out of the hoops?

A. If they are moved out two or three days from the hoops there is not very much necessity of having a cooling room, but I think farmers are making a woeful mistake in allowing their cheese to get away as soon as that. I do not think they should be away as soon as that.

Q. Who are to blame for that?

A. I think the farmers of this country are the men most concerned in this matter. They should see that their cheese or butter or whatever they have to offer for sale gets to the consumer in the best of condition. What you want is a good price and a good strong demand for your produce, and thus make a strong market for your goods. They are the men that we should be concerned about. Cheese if properly made from sound milk will go on improving for at least three months, and I think the farmers of this country are making a sad mistake when they do not see that their cheese factories are so equipped that the temperature can be controlled at all seasons of the year.

Q. When the cheese buyers and makers advise them to get them away in three or four days so that they will not lose in the shrinkage, what is the poor ignorant farmer to do?

A. That is it. We have had the same problem in the east, particularly in our poor factories. The makers seem to be anxious to get rid of them so as to save labor, and I believe for that reason alone the makers take in milk that they otherwise would not take in. They take in milk that they know perfectly well that cheese made from it will not keep. So long as they take in over-ripe milk and in a tainted condition they will not make good cheese. It requires the co-operation of every person concerned in this work.

Q. Don't you think that if all the factories could have cold storage it would make quite a difference in the yield?

A. Yes. I think that is one of the reasons why it takes more milk to make a pound of cheese than it should. The makers in the east are salting too heavily.

Q. Under the present condition of shipping out cheese every ten days, do you find cheese from cool curing rooms better than from ordinary rooms?

A. Yes. I believe the first weeek of the cheese is the most important.

Q. Do you find much difference in the yield?

A. In some factories not so much, in other factories we do. We find in our average factories in the east that they are not taking the advantage of the curing-rooms, and they still make a hard, stiff cheese. We had one or two factories this year that saved over a pound a box on all the cheese they made.

Q. Under the present conditions, is not a man who holds his cheese ten days placed at a disadvantage?

A. This year there was a time when it would have paid to have held the cheese. Of course, if a man holds his cheese and the market goes down, he is found fault with. I think you should not place yourselves in the hands of the speculator. Provide yourselves with the conditions whereby you can keep the cheese in the best way and the people will come after them. I do plead with the farmers to provide better conditions for curing and keeping cheese longer. Nothing that you can do will tend more to increase your home consumption than putting the cheese on the market better cured, and you must not lose sight of the fact that our cheese are going into a market in competition with cheese that are practically all cool-cured, and if we are to hold our position in the British market we must meet their conditions in the summer months. They produce their cheese in the winter time.

FURTHER EXPERIMENTS IN THE CARE OF MILK FOR CHEESE-MAKING.

By Geo. H. Barr, Ottawa.

[A report of this address will be found in the proceedings of the Dairymen's Association of Eastern Ontario.]

INSTRUCTION AT CREAMERIES, 1909.

	Western and Northern.	Eastern and Southern.	Total.
	Fred. Dean, Instructor.	M. Robertson, Instructor.	
Creameries	39	34	73
No. of Patrons sending cream	7,225	8,082	15,307
Tons of butter made 1908	1,743	1,536	3,270
Tons of butter made 1909	1,735	1,545	3,280
Gain in tons 1909	.....	.....	10
Full day visits	122	108	230
Call visits	31	42	73
Patrons visited	294	122	416
Average % fat in cream	26.5	23.2	24.8
No. tests made for moisture	188	194	382
Average % moisture	14.77	14.56	14 66
Samples showing over 16 % moisture	32	23	55
No. of Creameries cream gathered	34	32	66
" " both C.G. & S.	4	2	6
" " Separator	1	.....	1
" Creameries using Babcock Test	38	25	63
" " " Oil Test	1	9	10
" " " Box Churn	2	2	4
" " " Combined Churn	37	32	69
" " " Scale for sample	2	7	9
" " " large cans, C.C	11	11	22
" " " jacketed cans, C.C	3	6	9
" " " individual cans, C.C	20	4	24
" " " cream tanks, C.C	4	13	17
" " " small cans, C.C	1	.....	1
" " first class storage	17	15	32
" " fair storage	13	10	23
" " poor storage	5	5	10
" " no storage	3	4	7
Average temperature of storage	48	39.5	43.7
No. Creameries good water supply	24	31	55
" " fair water supply	14	3	17
" " poor water supply	1	.....	1
" " good drainage	24	29	53
" " fair drainage	12	5	17
" " poor drainage	2	.....	2
" " using culture	6	1	7
" " " cooler	17	8	25
New Creameries	3	1	4
Cost of new Creameries	$8,400	$1,968	$10,368
Other Expenditure	$4,515	$1,276	$5,791

There were in operation this year 73 creameries, 4 less than last year, 7 of these make both cheese and butter. 15,307 patrons sent milk and cream to these

creameries, 1,162 more than last year, and only 1,678 less than are sending milk to the 211 cheese factories. This makes a total of 32,292 patrons engaged in producing milk and cream for the factories of Western Ontario, 2,852 more than last year. In 1908 there was produced in Western Ontario from the creameries 3,270 tons of butter, a gain of 338 tons over 1907. In 1909 there was produced from the creameries 3,280 tons, a gain of 10 tons over 1908. The average per cent. of fat in the cream for the Eastern and Southern Group was 26.5 per cent., for the Eastern and Northern Group 23.3 per cent. The average per cent. of fat in the cream this year was 24.8 per cent. This is a gain of 2.8 per cent. in the average per cent. of fat in the cream for the season, showing that we are gradually beginning to secure a richer cream.

66 creameries are cream collecting, and 7 are both cream collecting and separator. 63 creameries are now using the Babcock test, while only 10 are left which use the oil test. It is to be hoped that these 10 creameries will see their way clear to discard the old oil test churn before the beginning of another season and adopt the Babcock test. The patrons of four of the 10 creameries using the oil test held annual meetings in December, and gave their presidents power to sign a mutual agreement to the effect that they would change from the oil test to the Babcock test for 1910. This arrangement will no doubt be carried out, which will leave only six creameries using the oil test.

49 creameries are using the pipette for taking the sample for testing, 9 creameries are using the scales, and 5 the scales and pipette together. This is 6 more than last year. Only three creameries are now using the box churn; 14 creameries are using the pasteurizer, the same as last year. 24 creameries are using the individual cans for collecting cream, 12 more than last year. 22 creameries are using large cans for collecting cream. 9 are using jacketed cans, 1 creamery small cans, and only 17 creameries are now using the cream tank for collecting cream.

230 full day visits, 73 call visits were made, making a total of 303 days at the creameries. 416 patrons were visited, the Instructors going out on the cream routes at different creameries, and while the drawer was getting his cream weighed and sampled the Instructor had a short talk with the patron regarding the care of the cream and separator. This is evidently doing a considerable amount of good, particularly in sections where the creamery has been receiving too thin cream, and cream which is far too sour. In some cases the Instructors found the separators in bad shape, and pointed out to the patrons the necessity for proper cleaning and skimming of a richer cream to get best results. 382 tests were made for moisture in butter, the average moisture content for the season is 14.66 per cent., last year it was 14.33 per cent. 55 samples showed over 16 per cent. moisture. These samples were taken from 26 creameries, 14 in the Southern Group, and 12 in the Northern Group. We would like to mention here that we are getting close enough to the line in the matter of moisture in butter, and I would strongly urge the creamery men to look out for this point, and beg to point out that we must not overdo this condition. The average highest test for moisture was 15.9 per cent., and the lowest was 13.64 per cent. The average percentage of moisture in the Southern Group was 14.77, while in the Northern Group it was 14.56. 6 creameries use a skim milk culture, and one creamery a cream culture. 25 creameries are using coolers. The average temperature of the storages in the Southern Group was 48 degrees, for the Northern Group 39.5 degrees, the average temperature for both groups was 43.7 degrees. 10 creameries have very poor storage and 5 creameries no storage. A few creameries still have poor drainage.

The total expenditure amounted to $16,159, made up of 4 new creameries, $10,368, and $5,791 spent in the usual improvements.

The creamery meeting held in Guelph on Dec. 8th, was exceptionally well attended. The change from having set addresses and confining ourselves to discussions of special subjects seemed to work out well and many valuable points were brought out by the makers.

I wish to thank the creamerymen and Instructors for their kindness to me. The Instructors have done their very best to improve the quality of the butter, to get better equipped creameries, and worked hard to make the season a success.

CREAMERY PROBLEMS.

By Prof. H. H. Dean, O.A.C., Guelph.

What we shall have to say about creamery problems will centre about three words, which are associated with progress. These words are, *more, better, brighter.* We prefer these words rather than most, best, brightest, because the latter indicate the highest possible achievement and when man has reached this stage there is nothing further to be done—he may as well quit this phase of existence. Progressive, improving, do-better dairymen are what is needed in the creamery and all other branches of the dairy.

More Cream per Cow and per Acre. Larger dairy farms are not needed in Western Ontario. A greater need is more cream per acre of land on the present farms. Because cream is a more or less indefinite commodity it will suit our purpose better if we use the term, milk-fat. Some recent investigations in Ontario would indicate that the amount of milk-fat supplied to creameries is less than one-half pound per cow daily. If the average 100 acres carry ten cows, and the cows milk 250 days in a year, we have 1,250 lbs. milk fat produced on 100 acres—an average of 12½ lbs. per acre. If we spread 12½ lbs. fat over one acre of land we shall have a very thin coating—so thin that it could not be seen with the naked eye. If we can increase the milk-fat production to 300 lbs. per cow and the number of cows to 50 per 100 acres—a by no means impossible increase—we shall have a production of 150 lbs. of milk-fat per acre (worth 25c. per lb., $37.50) which would be a visible quantity. If this were done it would mean more profit to the farmer, less expense for hauling cream, and hence less cost for manufacturing, as the cost of hauling the cream is about one-half the total expense for making the butter.

More Butter per Gallon of Cream. A great deal of loss to the farmer and extra expense to the creameryman results from what is commonly known as "thin" cream, i.e., cream containing too small a proportion of fat and too large an amount of skim-milk. Manufacturers and agents of cream separators can do a great deal to assist on this point. With average milk the separator ought to be so regulated that not more than twelve per cent. of the whole milk is taken as cream. This will give a cream testing about 30 per cent. fat. The advantage to the farmer in having cream which tests about 30 per cent. fat is that he thereby has more valuable food for stock and more fertility for the farm. The creameryman obtains more butter from a given volume of cream which is likely to be of better quality, as it is the skim-milk in cream which is the cause of sourness and most of the bad flavors.

More Money per Pound of Butter. What is a pound of butter worth as human food? It would be difficult to give a direct answer to the question because the value of foods is always comparative. A food has a certain value compared with something else. Generally speaking, we believe that butter is worth not less than twenty-five cents a pound. If there was less poor, cheap dairy butter put on the market it would tend to increase the consumption and the price. If farmers would patronize creameries, instead of making the butter at home and selling it, or "trading it out" at stores, and allow the expert salesman of the creamery to sell the butter, the price of butter could be advanced at least five cents per pound. We know of a creamery which practically controls the butter market of a certain city, and as a result of the farmers having patronized this creamery, the prices obtained for their butter are fully five cents a pound more than they formerly received after paying the cost of manufacturing, and they are saved the labor and expense of making the butter at home.

Better Cream. Stronger efforts are needed towards the improving of cream, the raw material for buttermaking. Ideal cream is that which is not over 24 hours old, sweet and clean in appearance and flavor, and tests an average of about 30 per cent. fat. Where pasteurization is practised sweet cream is very important in order to reduce the loss of fat in the buttermilk. Experiments conducted at the O. A. College during 1909 gave the following losses of fat in the buttermilk when cream of various percentages of acidity were pasteurized:

Cream containing less than .35 per cent. acid; buttermilk contained .13 per cent. fat.
Cream containing less than .35 to .4 per cent. acid; buttermilk contained .2 per cent. fat.
Cream containing less than .4 to .5 per cent. acid; buttermilk contained .34 per cent. fat.
Cream containing over .5 per cent. acid; buttermilk contained .52 per cent fat.

These results indicate the importance of sweet cream where pasteurization is followed.

Cream containing a relatively high percentage of fat kept at a low temperature (50° F., or under) and delivered frequently (at least three times a week) are favorable conditions for obtaining *better cream* at creameries.

Better Butter. Better butter means butter of cleaner, sweeter flavor, uniform in color, properly salted and put up in packages suitable for the market to which it is sent, and shipped to the consumer while in a fresh condition. Where butter is to be kept for any length of time, or where uniform quality is desired, pasteurization of the cream is one of the greatest aids in making better butter. The markets of the world are asking for more butter and better butter. It is the business of the creamery managers to supply this demand and exact the price. In the words of a somewhat trite phrase, "Plan your work, then work your plan."

This leads to the central thought of my address. One of the biggest creamery problems is how to obtain

Better Managed Creameries. To obtain this it is necessary to have:

1. A good manager—a tactful, good business man.
2. Loyal patrons—those who stay with the creamery, through good report and ill, so long as the business is well managed.
3. Quick, safe sales with prompt returns are necessary.
4. Prompt monthly or bi-monthly settlement with patrons.
5. A proper system of book-keeping and clear, concise monthly statements.
6. Careful, honest drivers.

Brighter Men. It is no reflection on the men at present engaged in creamery work to say the business would be improved if brighter men were attracted to,

and remained connected with, the creamery industry. Chas. Reade in one of his books says, "Better is a bright comrade on the weary road than a horse litter." To change this into modern dairy language we might say, "Better is a bright buttermaker in the creamery than an automobile or an air-ship for gathering cream."

We need men like those Goldsmith speaks of in his "Deserted Village":

"He tried each part, reproved each dull delay,
Allured to brighter worlds and led the way."

These are the men who hold the destiny of the creamery business in their hands. But we must not expect all to be smooth sailing. The creamery business has its ups and downs like everything else. Carlyle expresses this idea in one of his aphorisms: "The brightest triumph has a bar of black in it, and might always have been brighter." Another writer says: "We hesitate to call pain and sorrow evils, when we remember what bright characters they have made." All this leads us to express the hope that our dairymen shall not grow discouraged at results below expectations, nor give up because of apparent failures.

A term at the Dairy School will give a man encouragement, insight into the creamery business and enable him to solve creamery problems which cannot be solved so easily in any other way. There ought to be double the number of students at present in attendance at the two Dairy Schools of the Province. The founder of Cornell University, located at Ithaca, New York, said, "I would found an institution where any person can find instruction in any study." Our Dairy Schools ought to be institutions where any dairyman can find instruction in any branch of dairying.

To sum up the creamery problems they may be grouped as follows:

How to get more cream per cow, per acre and per farm.

How to get more butter per gallon or per 100 lbs. cream.

How to get more money per pound of butter.

How to get better cream, better butter, and better managed creameries.

And finally, how to secure and retain brighter men—better educated men—men whose hands and minds and hearts are in the creamery work. In this latter is to be found the main work of the revolving arm chair buttermakers, who may not know all the details of buttermaking and creamery practice, but who are, or should be, an inspiration to the toilers on the farm and in the factory.

Q. Will you tell us whether your skim milk was sweet or sour?

A. The whey and the skim milk was all sweet or practically so.

Q. Was that whey pasteurized?

A. The experiments I speak of were ordinary sweet whey. We conducted experiments comparing ordinary sweet whey with pasteurized whey. We found no difference in feeding ordinary sweet and pasteurized whey.

IS THE CANADIAN CHEESE TRADE IN DANGER?

By J. A. Ruddick, Dairy and Cold Storage Commissioner, Ottawa.

I am glad to hear that you are having such a successful convention. I do not know that I have attended a convention in Western Ontario where there has been a better attendance than there is here this afternoon. I am sorry that I missed the morning session for I know some of the addresses must have been interesting. I listened with a great deal of pleasure to Prof. Dean's address, and I will take

the opportunity of saying that there is just one point on which I would take a rather different view of the matter. I am sure Prof. Dean won't mind my objection. In fact that is one of the things he advocated: "Independence of Mind." While I quite agree that the returns which the patrons of cheese factories and creameries or others who are producing milk are not as large as they should be, and there is not as much profit in it as there ought to be, I would hardly take the view that he does, that we cannot expect to see any progress until the prices are higher. It seems to me that one of the surest ways of getting a higher price is to make a better article and take greater care in the production of milk and cream for the creameries. I know that certain creameries in Canada are paying a cent a pound more for their butter than the average creameries in Western Ontario where they are operating on the cream-gathering system. I have not a word to say against the cream-gathering system. I believe I was one of the first men in Canada to stand up for that system. We have been following poor methods, and by making better cream and by sending better cream to the creamery, I believe it is quite possible to raise the average price obtained for the butter by a cent a pound.

We say it costs 20c. a pound to produce butter, and unless we get more than that we are not getting any profit. I would not undertake to say at what point the profit begins in producing milk, because I think it is a very hard matter to determine. Supposing it costs twenty cents to produce a pound of butter, if we get twenty-one cents we get a cent profit, but if by better methods in caring for and sending cream to the factory, the butter is worth twenty-two cents, that is only one cent a pound in advance, but don't you see it means double as much profit, and that is the point we lose sight of. The same thing applies to the increase in the yields per cow. If you reach the point of profit at 3,000 pounds of milk a year, then if you raise it to 3,500 pounds, you have 500 pounds profit, but if you raise it to 4,000 pounds, you will have twice as much profit as you had on 3,500 pounds. And that is the point that I think we should keep in mind.

Mr. Barr advises certain methods of taking care of milk, and I am glad to say that I am sure you will recognize that the plan which he recommends does not involve any extra expense or labor. In fact it is rather less labor than any plan that has been recommended heretofore, and it has been proved without any doubt that handling milk in that way will enable the cheese maker to make a better article, and a better article means a better price, and that probably is one of the surest ways of getting a better price. Co-operation of the patrons and the cheesemakers is required.

If we were to judge of this matter by the comments which have appeared in the press during the last year or so, we might readily come to the conclusion that the Canadian cheese trade was in serious danger of being wiped out. 'Canada is Losing Her Cheese Trade," "The Cheese Industry a Declining One," "A Great Change has come over the export cheese trade of Canada within the past few years owing to the competition which has sprung up from New Zealand." "The only hope for Canadian cheese in the British market lies in the possibility of New Zealand turning to the manufacture of butter." These are some of the headlines and phrases which have appeared in the Canadian press during the past year.

Personally, I do not share these pessimistic views, and I propose to give you some of my reasons for disagreeing with such opinions. In the first place, let me say that not a single box of Canadian cheese has been displaced on the Old Country market by New Zealand cheese. As a matter of fact, the increase in New Zealand shipments is wholly a result of the decrease in Canadian shipments

and not the cause of that decrease. I am personally familiar with the situation in New Zealand and I speak with confidence on that point. Had it not been for the falling off in Canadian exports, which resulted in a higher relative price for cheese as compared with butter, and thus encouraged the New Zealand factories to make cheese instead of butter, the New Zealand shipments of cheese would have shown very little increase during the last five years. The Dairy Commissioner for New Zealand appreciates the situation when, referring to the decrease in Canadian shipments in his last annual report, he winds up with the statement, "It falls to New Zealand's lot to supply to the home market this shortage in Canadian exports."

I do not propose to burden this paper with many statistics, but a few figures must be quoted in order to get a clear conception of the situation as affected by the respective exports of Canadian and New Zealand cheese.

A Comparison of Exports. In 1904, the Canadian exports reached the maximum, in round figures, of 233,000,000 pounds. In 1909, the quantity exported was 164,000,000 pounds, or a decrease of 69,000,000 pounds. In 1904, the New Zealand exports were 9,000,000 pounds, there having been little or no permanent increase for about ten years. In 1908-09 the exports from New Zealand to Great Britain had risen to 37,000,000 pounds, an increase of 28,000,000 pounds. It sounds big and rather alarming to say that the New Zealand shipments have been quadrupled in four or five years, but the actual amount of the increase is considerably less than half the decrease in the shipments from Canada. It will be seen, therefore, that the total of the imports of cheese into Great Britain from both countries is now smaller by 42,000,000 pounds than it was in 1904. It is difficult to see where there is any serious menace to the Canadian cheese trade in these figures. It is worthy of note also that the increase in Canadian shipments for the season of 1909 over those of 1908 will probably be greater than the increase in the shipments from New Zealand for the same period, and yet this fact scarcely receives a comment, while the New Zealand increase has been harped on continually.

I do not mean to say that the increased shipments from New Zealand would have had no effect on the market if the Canadian shipments had been maintained at their maximum. But then, as I have already pointed out, if the Canadian shipments had been maintained, New Zealand shipments would not have shown any increase. If there is any menace to the Canadian cheese trade in the New Zealand shipments, it is not in the mere volume of these shipments, but in certain qualities which the cheese possess and some other things which I shall refer to later. Overproduction alone, with the inevitable lower scale of prices, would work its own cure, for in that event the New Zealand output would at once decline and be replaced by butter. There are other aspects of the situation, however, which should give us more concern. We must not overlook the sentimental effect of a new supply on the market and when the supply presents such features as the New Zealand cheese does at present, it offers a rather good field for the operation of bearish tactics.

Importance of Cool-Curing. New Zealand cheese are all practically cool-cured, and, owing to the distance from market, they do not suffer in reputation, as ours do, by being sold in too green a condition, because, even though they are shipped as soon as made it takes about two months from the time they leave the factory until they reach the warehouse in Great Britain. We should have no difficulty in meeting that phase of the competition. Cool curing is becoming more general in Canada every year and there is no reason why we should not, with that improvement, give our cheese ample time to mature before they are sent forward.

Now, if I stopped at trying to prove that the Canadian cheese trade is not seriously threatened by the New Zealand competition, at least not for the reasons that have been advanced, I should be failing in my chief object in preparing this address.

Canadian Dairymen and Thoroughness. It has been a sort of hobby of mine to study dairy conditions in other countries, and I have had exceptional opportunities for doing so. In following up this line of investigation, I have been impressed with two things, namely, the apathy or general indifference to cause and effect and a decided lack of thoroughness on the part of Canadian dairymen, as compared with those who compete with them for a share of the world's trade in dairy products. There is perhaps some excuse for this state of affairs in the fact that those other countries which I have in mind, like New Zealand, Denmark and Holland, specialize in dairying, and having their energies and thought directed along one line, they naturally become more expert and more far-seeing in that particular direction, than we do, who have our attention divided among several lines. Nevertheless, this carelessness, or lack of thoroughness, is a serious danger to the dairy industry.

An Instance of Lack of Care. Allow me to draw your attention to a circumstance which Dr. Connell of Kingston mentions in his report of an investigation made last summer into the question of the pasteurization of whey, which illustrates this point very aptly.

You all know that the cheese factories have been advised to pasteurize the whey, or at least to heat it to a temperature of 155 to 158 degrees, in order to destroy most of the bacteria in it, and thus prevent to a large extent the contamination of the milk cans and improve the feeding value of the whey. Careful experiments and considerable experience have proved the value of this practice. Dr. Connell states that at two out of the five factories which he visited, the heating was being done without any tests of the actual temperature being made. The cheesemakers admitted that they had never used a thermometer to determine whether the work was being done properly or not. In view of the warning and advice given by those who have recommended this practice, that overheating would coagulate the albumen and thus prevent the proper distribution of one of the most valuable feeding constituents which whey contains, and that underheating would fail entirely in the object aimed at, and might be positively harmful, it is hard to find a word strong enough to properly characterize such slipshod practice, especially in view of the marked benefit which results from careful work in this connection. Here we have a case where somebody has incurred the expenses necessary to carry out the work, where somebody was paying for the fuel to heat the whey, and yet nobody knew whether the result aimed at was ever attained, or whether positive injury was not being done to the whey. Does the cheesemaker who deliberately neglects his plain duty to such an extent deserve to succeed? Do the owners or managers of a factory who will permit of such laxity on the part of employees deserve the confidence or support of the patrons? Do the patrons themselves who are so neglectful of their own interests as to allow themselves to be imposed upon in this manner deserve any better treatment than they get? I leave it with you to find the answers.

No Intention of Being Personal. I have no intention of being personal in mentioning these cases. I do not know what factories are referred to in the report of Dr. Connell. I have merely cited the facts as reported, because they are typical of things which are occurring every day in connection with our dairy opera-

tions. They are not confined to any one class. In a case such as I have quoted, I blame the patrons, in a sense, as much as I do the cheesemaker who had actual charge of the work. When they demand and pay for efficient service they will get it; that is, if they study their interests sufficiently to know when they are getting it. As long as they accept slipshod, inefficient service, that is the kind of service they will get. This is the sort of thing which, in my judgment, constitutes a greater danger to the cheese industry than any competition which is in sight.

Another danger to the dairy industry lies in the fact that a very large proportion of the cheese and buttermakers after a few years' work drift into some other occupation which offers greater attractions. It is a great loss to the industry that a large number of men with their accumulated experience should leave it every year, and there seems to be no good reason why a business which has been so prosperous and which has done so much for the country should not suffer sufficient inducement to a greater number of men who will be content to make it a life's work. It is largely a question of remuneration. I do not say it in a spirit of fault-finding, but I think it is a disgrace to one of the most important industries in the country that the men who, as a class, have contributed most largely to its success should receive such scanty reward. It would be nothing but good business sense to see that those who are responsible for the economical handling of the raw products and for the quality of the finished article, should be better paid. I do not advocate indiscriminate increase of pay so much as good pay for good men. I know enough about it to know that some men would cost more than they are worth if they worked for nothing.

Now I come to a matter which it seems to me constitutes a greater danger to our export dairy trade than any other thing that I know of. For some years past, especially since we began shipping our cheese so green, merchants in the Old Country have complained a great deal about the shrinkage in weight and the losses which they sustain in this connection. They point to the fact that there is seldom any loss on New Zealand cheese, because the practice is for the New Zealand factory to allow 1 1-2 per cent. off marked weights. I do not suggest that Canadian factories should make a similar allowance. A loss of this kind which is fairly constant in amount, becomes recognized as a part of the expense of handling the cheese and is eventually taken into account when the price is being fixed. That which I would draw attention to is a discrepancy between marked and actual weights of an entirely different character and it is not wholly due to shrinkage of the cheese.

Since this matter was first brought to my notice, I have been at some pains to collect facts concerning it, but I have hesitated for certain reasons to bring it up for public discussion. It has reached a stage, however, when some effort must be made to have it remedied.

I have secured the record of the weighings of 68 lots of cheese containing in all 7,131 boxes, among which there were 219 boxes wrongly marked as I have described, the errors varying from 4 pounds up to 12 pounds per cheese. Any difference of 4 pounds and over could not possibly be due wholly to shrinkage, and except in one case, where all the cheese in the lot were overmarked from 4 to 7 pounds, there is no reason to believe that the errors were due to inaccurate scales, because I find on examining the record that these errors occurred in lots of which the other cheese were either marked O.K. or showed only the usual loss due to shrinkage.

The plain facts are that these errors were due either to the grossest carelessness or to something worse. Of the 219 boxes wrongly marked, 193 were overmarked

and only 26 were undermarked. The overmarkings amounted to 1,193 pounds and the undermarkings to 122 pounds. You can draw your own conclusions. The preponderance of overmarking is significant. Whether these errors were all the result of carelessness or whether some of them were deliberate attempts to defraud, makes very little difference in the effect which they have had on the minds of British dealers. The merchants believe that they are being cheated, and the loss and annoyance which result from claims for short weight are the very things to cause them to turn to other and more reliable sources of supply.

There is no man in the world who will quit trading with you quicker than an Englishman if he thinks you are not dealing fair. If you cheat him out of the value of 10 pounds of cheese under circumstances where there is a question of honor involved, he will feel more aggrieved and put more stress on it than he will for the loss of 100 times as much in a straight business deal. A large house in Glasgow made a contract last year with a Canadian firm for a quantity of a certain product, from another branch of agriculture. The Canadian firm threw up the contract and gave reasons as to why they were unable to fulfil their undertaking. It so happened that the Glasgow firm were better pleased than they would have been if the contract had been carried out; but I happen to know that they went to a great deal of trouble to find out if the reasons given for the failure on the part of the Canadian firm were the true ones. They wanted to know if this firm was honest and straightforward, because, if not, they would deal no more with them.

I have had many bitter complaints about this overmarking of cheese, and I know it is doing great harm. Canada has had a good name for honesty in the dairy trade. We have rather prided ourselves on it. Shall we allow that reputation to be tarnished either by inexcusable carelessness or deliberate dishonesty? Every dairyman in Canada is interested, because it means dollars and cents to him directly. Then let the factory management deal severely with the responsible party when cases of this kind are reported, as they will be if they occur in the future as they have in the past.

I am glad to be able to say that the great majority of factories mark their cheese correctly. The better managed factories are not guilty of such irregularities, but these remarks are addressed to all Canadian dairymen, and I hope they may have the effect of causing those who have been responsible for these shortcomings to be more careful in the future. It is up to the merely careless man to see that he is not classed among the dishonest ones. It is up to the factory managers to assure themselves that the weighing and marking of the cheese are done in a careful and honest manner. It will be worth while for the producers of milk to interest themselves in the matter, for it is they who will suffer for any loss of reputation on this account.

So much for the dangers which threaten the cheese industry. Let us now consider the assumption that because the exports of cheese and butter have decreased there is a corresponding decline in dairy production.

The Dairy Industry Not Declining. I propose to take a few minutes of your time to show you, if I can, that the Canadian dairy industry, as a whole, is not declining, but that on the contrary, it is showing substantial gains from year to year. Of course, we do not expect to see any more of the rapid development which took place in the nineties, when new territory was occupied by the organization of hundreds of cheese factories and creameries. The field is now fairly well occupied in Quebec and in those parts of Ontario where dairying is likely to engage

the attention of the farmers, and the extension of the industry is now chiefly limited to the development in the newer provinces and to improved production in the older districts.

Home Consumption Per Capita. It is impossible to quote exact figures, because, unfortunately, we have no annual statistics of the actual production of dairy produce in this country. That is why we have in the past relied on the figures of our export trade, of which we do have statistics, to measure the progress of dairying from year to year. With the rapid growth of population, affecting the home consumption, the export trade is no longer a reliable index of the growth of the industry, and it never was a true indication of its magnitude. I have made as careful an estimate as possible of the consumption of milk, butter and cheese in Canada, and I put it between 10 and 12 dollars per capita. The consumption of these products in the United States is said to be over $10 per head, and I think ours is larger; but to be conservative, we will put it at $10.

Total Home Consumption. The population of Canada, in 1901, was 5,371,315. At $10 per head the home consumption of dairy produce, including milk and cream, by that many people, would be $53,000,000. The combined value of the exports of cheese and butter in that year was $24,000,000 (I use even figures for simplicity), making a total production of $77,000,000. It is estimated that the present population of Canada is now about 7,184,700. On the same basis, then, the present home consumption in 1909 would amount to $71,000,000. If we add to this the $22,000,000 as the value of the butter, cheese and condensed milk exported during the last fiscal year, we have the sum of $93,000,000 as the value of the total production at present, or a gain of $16,000,000 since 1901, as against a decrease of only $2,000,000 in the exports between 1901 and 1909. Of course, the decrease in exports appears to be greater if we compare last year with 1903, in which year our exports of cheese and butter reached the maximum of $31,000,000. But conditions were abnormal that year and it does not make a fair comparison. If we average the value of the exports in the four years from 1902 to 1905, it gives us $28,000,000, which, compared with last year's figures, shows a decrease of only $6,000,000. Against this we have an increase in consumption of something like $2,000,000 a year, or $8,000,000 to $10,000,000 more than it was in 1905. I have used values only in making these comparisons, because it complicates the matter to deal with quantities of butter and cheese, and the total production of milk is the important thing.

Specific Increase in 1909. Then we get another view of the matter from the specific gains which are reported for the past year from various sections. The production of cheese in Prince Edward Island in 1909 showed an increase of 11,000 boxes, or 30 per cent. over that of 1908. This increase in due partly to more favorable conditions and partly to a keener and more vigorous policy on the part of the farmers. Prof. Cumming, of the Truro Agricultural College, speaking recently of the marked revival of agriculture which appears to be coming in that province, used these words:

"The greatest evidence of improvement is the marked interest which is being taken in dairying, for which the Province is eminently adapted. This we can show best by stating that the demand for good dairy bulls is far in excess of the supply and, what is still more encouraging, those who are buying are, for the most part, seeking bulls from cows noted for their large production of milk. Whereas a few years ago it was very difficult to get a sale for dairy bulls from the College Farm, to-day the bulls that are available can be sold over and over again, there being five or six purchasers for every one of the animals and the demand being keenest for those from the best milking cows, for which the College herd is famous."

Mr. Putnam reports that the returns from the cheese factories in Ontario show an increase of nearly 100,000 boxes in the output for 1909, as compared with 1908. In Alberta the Dairy Commissioner reports an increase of 500,000 pounds of butter in 54 creameries in 1909, or 70 per cent. increase in two years. In Saskatchewan the increase in 1909 was 70 per cent. over 1908.

Exports for 1909. The exact quantity of cheese that will be exported for the season of 1909 will not be known until the last shipment is made, but all estimates show a substantial increase over the season of 1908. These estimates vary according to the source, but it seems safe to say that had it not been for the large shipments of cream to the United States the cheese exports for the past season would show an increase of well over 100,000 boxes. The exports of butter so far for the season of 1909 are about 50,000 packages less than in 1908, but the receipts at Montreal to November 30th were only 25,000 packages behind the previous year. It is plain, however, that even though the exports of 1909 are only equal to those of the previous year, there must have been a substantial increase in production to keep pace with the increased home consumption.

Export of Cream to United States. This export of cream to the United States, made possible by the reduction of the duty to five cents a gallon under the new tariff as against the former duty of two cents a pound, deserves special mention, for here we have a real menace to our cheese trade as far as it affects the volume of the exports. Every gallon of cream which is exported, under present conditions in our export dairy trade, practically means just that much less cheese for export, and the indications are that this export cream trade may grow to large proportions. The figures are available only up to the end of November, but they show a surprisingly rapid growth. Month by month they are as follows:

August	16,509	lbs.
September	121,602	"
October	390,993	"
November	700,599	"
	1,229,703	"

It seems quite probable that the total shipments up to the end of the year will not be less than 2,000,000 pounds of cream. As this cream is made very rich and averages over 40 per cent. fat, it represents somewhere about 1,000,000 pounds of butter. The United States duty on butter is 6 cents a pound, therefore, it is easy to understand why the cream is imported, because the duty of 5 cents a gallon works out a little over one cent a pound on the butter which it contains. How long this may continue I am unable to say. Well-informed people in the United States, with whom I have discussed the matter, say the tariff will not be changed during the term of the present administration. It must be dealt with by Congress, and I understand that there is great reluctance to having the tariff question opened up.

I do not see that the producers need worry over the matter so long as they receive good prices for the cream, but there is one feature of this development which is to be regretted. I refer to the closing of cheese factories and creameries by the purchase of cream direct from the farmers. The owners of these factories will lose both their business and their investment, and when the old duty is restored, as it most likely will be, sooner or later, the disorganization which has occurred will be awkward.

Decline of Export Would Not Mean Loss of Industry. But this cream business is somewhat of a digression, and to come back to the main point, I wish to make one more observation on the question of the export trade, and it is this. If it should happen that we do not increase our production as fast as the home consumption grows, we will undoubtedly some day see our export trade reach the vanishing point. While I think that failure to maintain our export trade would be a great pity and a loss from a national point of view—and I don't see any immediate prospect of its being realized—I have yet to be shown that our producers would suffer because they had found a market for their whole output at home, instead of being obliged to send a part of it abroad. The United States, in 1881, exported $16,000,000 worth of butter and cheese, but to-day, although they are producing more of these products than ever before, it is all required for home consumption and the supply has to be supplemented by imports from other countries. What is the result? Cheese is selling to-day in New York State at 16 to 18 cents, and butter at over 30 cents a pound. It may be of interest to state that the total annual production of milk in the United States is valued at between eight and nine hundred million of dollars, and the consensus of opinion among the leaders of dairy thought is that dairying is on the eve of the greatest development that has ever been seen in that country.

Summary. Now, to sum up, I have tried to place the competition of New Zealand in its proper light, so that you might see its true proportions and the particular way in which the competition may be felt, and thus be the better prepared to meet it. I hope I have convinced you that you are in a position to meet this competition on even terms at least; and further, that the most serious dangers which threaten the industry are to be found right at home, and not at the market end of the business.

I have also tried to show you that there is no general decline in the dairy industry, but on the contrary, that the prospects were never better than they are at present; that there is every inducement to push the industry to even greater proportions than it has yet assumed. At the present moment cheese is relatively the cheapest article in the provision line, and that makes for increased consumption and better demand.

I consider it important to correct any impression that the dairy industry is a decaying one, because repeated assertions to that effect would be one of the surest means of bringing about that result. If a man is persistently told that he is ill, or that he looks ill, the chances are he will soon be on the down-grade in health. Canadian farm industries are peculiarly susceptible to that sort of suggestive treatment. We have seen a rather marked example of that during recent years, in connection with a branch of agriculture closely allied to the dairy industry. It is important also that the minds of dairymen should not be diverted by talk of remote or even imaginary dangers from more real and present ones.

I believe it is desirable also that we should drop the habit of estimating either the progress or the importance of the dairy industry on the basis of the export trade, because that trade represents probably less than 25 per cent. of the total production, and that we should take more account of the home trade and how it can best be served. That part of the dairy business which consists in supplying milk, cream, butter or cheese to the Canadian people pays as well and is just as important, dollar for dollar, as the export trade is.

In conclusion, let me give you a calculation which may serve the purpose of impressing you with the magnitude of the industry in which you are engaged. The

total value of our exports of butter and cheese from 1880 down to the end of the last fiscal year amounts to $359,707,012 for cheese and $62,399,931 for butter. If we add to these items the home consumption of milk, butter and cheese for the same period at $10 per head, we have the unthinkable sum of $1,885,089,703. Now, just think, if you can, of the enormous volume of milk which has been produced to be worth that much money, at $1 per 100 lbs. It would make a lake approximately eight miles long, one mile wide, and fifteen feet deep; and it would supply a stream ten feet wide and one foot deep, running at the rate of three miles an hour, for two years and two months.

THE CHAIRMAN: I am sure you have listened with a great deal of interest as I have to this excellent address of Mr. Ruddick's. The point we are most interested in is the encouragement we get out of it to go on with this great industry. When I saw this heading a few days ago I was anxious to know what the outlook was for Canada, and I am satisfied to know what I have heard to-day that it is up to us to force this business along.

PROF. DEAN: For fear I have given a wrong impression, let me remark that what I intended to say was that if you expect a farmer to take better care of his milk and cream you must pay him a correspondingly high price. That was the proposition I tried to make clear; that if he is expected to produce better raw material, he must see tangible evidence that it pays to do so, otherwise he is not inclined to follow any of these suggestions. That was the proposition that I tried to make clear. (Applause.) I am sure that we have all listened with pleasure to the very optimistic report which the Dairy Commissioner has given us with reference to the cheese business. I should be very sorry to think that our cheese business was in any danger, but my candid judgment is that there is danger in the cheese business. One point Mr. Publow referred to this morning was that question of the increased number of pounds of milk required to make a pound of cheese. I can remember when the rule in our factory was one pound of cheese for ten pounds of milk. I do not say that was a fair rule, but that was the rule under which the factory was operated. At the present time it takes practically eleven pounds of milk to make one pound of cheese. Why? There is one of the questions that the cheese men of this country have to answer, and the farmer is going to know why it takes eleven pounds of milk to make one pound of cheese when it used to be made out of ten. I have my own view on that question, but I have not time to take that up, although I do think it is one of the questions that should be given careful attention. One reason is that most of our factories pay according to the weight of milk delivered, and that, I believe, is the fundamental reason why it is taking more milk to make a pound of cheese. Until we change that system, it will not be remedied, and if we continue it it will take fifteen pounds of milk to make one pound of cheese. I believe it will pay our people to pay for milk according to its cheese-making value. (Applause.) We shall never be able to reduce the pounds of milk that it takes to make a pound of cheese until we pay according to the quality of the milk they deliver at our factories. So long as we put a premium upon watering milk and skimming milk we will have to look for an increased number of pounds of milk to make a pound of cheese.

Let me say a word in regard to the criticism that has been made with reference to the plan adopted by us to divide the proceeds of the factory according to the percentage of fat, plus 2. In that system we are trying to get at two constituents in the milk which covers its value for cheese making, namely, the fat and the casein. Since the principle has been adopted, we have a casein test, and

to-day there is no excuse for any cheese factory not knowing what percentage of fat or casein there is in the milk delivered by each of the patrons. So far as our work has gone we have found that the plan which we adopt is near enough for all practical purposes—using the Babcock test to determine the fat, and the casein test as a check on any adulteration by watering or skimming. Let me say that I do not think it is possible to devise any system which will make men honest, but the plan we advise is based on the assumption that every man is honest until you prove he is a rogue. Other systems go on the assumption that every man is a rogue until you prove him to be honest. Which system is more correct? The system based on the percentage of fat plus 2 is, to my mind, the fairest and most practical system which has yet been devised, using the Babcock test to determine the fat and the casein test to determine the casein.

Q.—Are casein and fat alike for cheese and butter?

A.—No, the percentage of fat for milk and cream determines its value for butter-making. The percentage of fat and casein determines its value for cheese-making. There is a difference in milk for butter-making and cheese-making. These are questions we ought to consider. We have too many addresses and too many speeches, and not enough from the floor of the hall at these meetings. We should thrash out these questions and get the view-point of the man in the factory and on the farm, who are in contact with these things every day. The trouble with us revolving-armchair dairymen is, that we do not and cannot put ourselves in the position of these men on the farm and at the factory. Until we do that we are working at a disadvantage, and the advantage of discussion in meetings of this kind is that you get the viewpoint of men in actual contact with the business, and, therefore, I think that at all meetings of this kind we ought to have less speeches and more criticism from the floor of the hall. (Applause.)

The Chairman: I quite agree with what Prof. Dean has said. While I have not had much to say as a practical man, because it was out of my capacity as a chairman to say anything. I have been secretary for one of my factories for over thirty years. I did not own the factory during the first part of that time. For over twenty-five years I have been secretary for the second factory, and for a number of years I have watched the gradual growth of the number of pounds of milk required to produce a pound of cheese. I can well remember the time in the early years, when our average would run, for a season, about 10 pounds of milk to produce a pound of cheese. I am not stating anything I cannot bear out as facts, because I have these records in book form taken down month after month, year after year, just as they actually occurred. They are valuable records, and I can go over them and make comparison. Two years ago, at the annual meeting, I gave the history of that factory for twenty-five years. I showed them the entire output from year to year, and the total, with the averages from year to year and the average price. The remarkable point in connection with it was the increased average price for a pound of cheese received. I do not want to say too much about these early days when we made a pound of cheese out of ten pounds of milk. We had all sorts of cheese on the shelves. We did not have the even grade of cheese that we have at the present time, and our cheese was frequently faulted. Sometimes we were bothered a great deal with what we used to call skippers. In later years we have never had a skippered cheese, and the even grade of cheese we are making to-day is all due to the instruction that has come out within the last five or six years. Within the last four or five years more had been done in Western Ontario towards improving and bringing out a uniform grade of cheese better than ever before. But I do not

say that we have reached perfection, for while it is true that the average is higher, yet there is a cause for it. I think you will bear me out when I say that the percentage of fat is less than it used to be a few years ago. Another thing we are told by those who have given us instructions in the factories is that in order to get this uniform grade of cheese we have to handle the milk in a far different manner than we used to years ago. In 1864 I made cheese myself in one of our factories, and I can well remember how we took in the milk. It was very seldom that we rejected a can of milk. It was all put into a vat, and the process I went through then in manufacturing that into cheese was not at all as at the present time. We knew nothing at all about making individual curd tests. We had to be content with many difficulties in flavor that we have not to-day, and it was a very frequent occurrence to have a floating curd. As Mr. Barr said, when he started in the early days he had these curds looking over the vat at him, and I have seen them many times. We got more stuff out of the milk than we get now, but it was not to be compared in quality. There is another cause for it, generally speaking. All over the province there has been quite a change made in the kind of cow kept for supplying milk for cheese factories. In the early days the Holstein cow was very rarely heard of, and while we know that she gives a large flow of milk the percentage of fat is less than it used to be in the old days, and that, together with the fact that it requires a somewhat different handling of the milk and the loss of a small quantity of solids in order to get the quality, may have something to do with raising the average number of pounds of milk to produce a pound of cheese. A few years ago, when I came more in touch with this work than ever before, and joined this Association, and had an inside look into the work of the industry, it was stated that the industry that I represented produced the worst cheese in Western Ontario, and I did not feel very good over that. It was said, "If you want poor cheese go down to Simcoe district." One has a certain amount of pride in his business, and it was my ambition to be up to the rest of the trade, and I tore down my factory and put up a building that cost in the neighborhood of $5,000. I had a curing-room built so that it was frost proof when it was twenty degrees below zero, with a cool curing-room and ice chamber. I put in up-to-date machinery and engine house, separate from the making room, with a brick smoke-stack fifty feet high, cement floors, individual curd tests, and secured a maker who had been at the Agricultural College Dairy School, and with all these appliances I went at the business in earnest to build it up and make a better output. I got in touch with some of the buyers who never handled our stuff before, and I am safe in saying that at some of our sales the remark was made to me that they never expected to find such goods in that district, and they were far better than they thought of getting, and that was encouraging.

To come back to the point, I found the average number of pounds of milk to produce a pound of cheese was still growing, and my record was such that they showed considerably over 10 1-2 pounds of milk to produce a pound of cheese, and in some months it ran over 11. That is a part of the work I cannot overcome. Two years ago, when the question of pasteurizing was taken up, I was asked to preside at the Simcoe District meeting as Chairman, and I thought it was a chance to make some further improvements, and I determined then in some way to pasteurize the whey. We went at it and put in pipes, and our plan was to use the steam injector and take it up into the top of the tank. We did not run our whey into the ground vat, as we thought it took too long to get the steam to rise. Last year we tore that out, and just above the steam injector we put in another pipe, a

live steam pipe, into the pipe that carries the whey above the injector, and we turned the live steam in there, and it was pasteurized as fast as it went up. Every day that whey was measured out to each patron in proportion to the amount of milk he sent in, and we had the work cut out so fine that we always kept the whey tank empty, so that it was cleaned with hot water every day except on Monday morning.

Then we adopted a plan of paying for this milk by test. Our plan was to test the milk, and to the butter fat test add 2 to represent the other solids, and I think in doing that I introduced a feature that has been the means of reducing the average number of pounds of milk to produce a pound of cheese more than anything I have ever done. I find on comparing the season 1909 with 1908 that the average number of pounds of milk required to produce a pound of cheese has run from one-half to three-quarter pounds less than it did in 1908. I have not yet made our annual statement, and I do not exactly know what the average will be, but I am satisfied by my observations from month to month that I am going to be away ahead of the year 1908 in the average number of pounds of milk to produce a pound of cheese. I do not expect to get down to that ten pounds, but I know that the change from the pooling system to paying by test, when first spoken of, caused a great deal of talk, and I had considerable difficulty in holding some of my patrons, and these same patrons have told me that they are well satisfied with it, and I have yet to hear from the first patron who is not satisfied. I have gotten away entirely from the old anxiety and fear that the Instructors will find some of my patrons tampering with the milk.

Q.—Why should that change reduce the amount of milk required to produce a pound of cheese?

A.—It was carried out throughout the entire season; we introduced it last May.

Q.—That would not change their cows?

A.—No, there was no change made in the cows. The quality in the year 1909 excelled anything that I ever had to do with since I have had any connection with the business. (Applause.)

ORIGIN OF THE DAIRY FARM COMPETITION.

H. B. Cowan, Editor of "Farm and Dairy," Peterboro.

I feel to-night that you are the victims of unfortunate circumstances. The conditions are something the same as those described by Senator Earl, of Michigan, who came over to address one of our conventions. He is cross-eyed. When he got on the platform one of the first remarks he made was, "I am cross-eyed, but it is not my fault. My father had a large family. Unfortunately I was the youngest in the family, and therefore, I had to take the only pair of eyes that was left." Your President met me at the head of the stairs when I came in and explained that he had been disappointed in the speakers and that he wanted me to help him out. You will see, therefore, that the above are the victims of circumstances.

At our convention this afternoon we heard something said of armchair critics of agricultural methods. To-night we have the pleasure of looking not at critics but at some of the real genuine articles: Practical farmers, men who have made a success of farming, men who have won the highest places in the

prize farm competition which was held last year throughout the Province of Ontario. Your Chairman has asked me to say a few words on this prize farms competition and if you will bear with me I will venture to do so.

I think that you will agree with me that the object of all associations such as these as well as of our Agricultural Colleges and Farmers' Institutes is to ascertain the best and most successful methods of agriculture and to describe them for the benefit of others. There are two great sources of information, the theoretical and the practical. We were desirous of learning the methods that are used by our most successful farmers.

Some years ago Mr. W. J. Spillman of the United States Department of Agriculture, visited a farm near Philadelphia and discovered that a minister who owned it was making a great success of it although it contained only fifteen acres. When he bought it there was a mortgage on it of $7,200. The man who had owned it before had barely been able to keep two or three animals. The minister increased the fertility of that land so much that he was able to raise the roughage for thirty head of stock, including seventeen cows in milk. Within six years he paid the mortgage and later amassed a small fortune. The methods he employed were described in a bulletin issued by the Department of Agriculture and the demand for that bulletin was something phenomenal. It ran through edition after edition. Copies of it went all over the United States and people travelled many hundreds of miles to visit that farm.

Some twenty-five years ago we had here in Ontario our first good farms competition. It was won at that time by a man whose name is familiar to many of you, Mr. Simpson Rennie. Even to-day as he visits many parts of the Province as an Institute speaker, Mr. Rennie is pointed to as the winner of that prize. Any stranger who drives through that portion of York county, where his farm is situated, has it pointed out to him with pride. Farmers have gone out on the trains to visit that farm to study the methods that were used so successfully there by Mr. Rennie.

My own first connection with a prize farm occurred some ten years ago when I happened to be in Pontiac County, Que. A farmer invited me to spend the night at his place. While there I found that the Province of Quebec was in the habit of offering prizes for the best farms in the whole province. The province is divided into five districts, and each year there is a competition in one of the districts. The farmer whose place I visited had won the 3rd and 4th prize in his district. His children and his wife were quite proud of the honour. They showed me the medals and some of the prizes he had won. The following day he took me over his farm. He was planning to move his barns up on higher land to get better drainage, he had the tiles on his farm with which to do some underdraining and he intended the next two years to do considerable fencing to get ready for the next prize farms competition. He wanted to win the first prize if he could. As he drove men through the district he introduced me to several farmers who were doing the same. I concluded that a competition which stirred up the farmers to make such improvements was very commendable.

We sometimes hear discussions on how to keep the boys on the farm. One of the reasons why the boys are leaving the farm is because they read so much in the papers about successful doctors, lawyers, and merchants. I have often thought that if we could show what our successful farmers have accomplished it would do much to stir up the ambition of our boys and to lead them to stay on the farm.

A striking example of what can be done on a farm came to my notice a few years ago while visiting the farm of Mr. R. R. Ness at Howick, Que. When only 19 years of age, Mr. Ness left his home to work for his cousin. His wages were to be $200 a year and a share of the profits. That was not a very large salary. After two years his cousin wanted to sell the farm and Mr. Ness offered to buy it. He had only $400. He arranged to give a mortgage on the farm for $4,000 and his cousin agreed to trust him for the other $2,000. With the $400 he bought some of the live stock and second-hand implements and he had to get trust for some of them. The first year two out of the three horses he purchased died and within three or four years two-thirds of his cattle had to be disposed of on account of sickness.

At the time he purchased the farm he decided to make another venture and he picked out a wife, and from all I have heard that was probably the best investment he ever made. A great deal of his success has been due to the assistance he has received from Mrs. Ness. Although he is only thirty-five years of age, Mr. Ness has not only paid for that farm but he has bought the farm adjoining, and recently with his father and brother he bought a third farm. He has also built up the most famous Ayrshire herd on the continent. He has taken that herd from one end of Canada to the other, having won prizes at exhibitions from Halifax to Calgary. His prize winnings a year ago were only a few dollars short of $2,000.

Mr. Ness has constructed a barn which an official of the Department of Agriculture has said he considered to be the finest farmer's barn in the Dominion. It is laid out from beginning to end with an eye for economy of labor. It is fitted with electric light. Nearly all the south side are windows. Flowers are often kept in nearly every window. When you step inside the stable—he is milking I believe 80 head, his milk check for the month of November being something over $1,000—and when you look down that row of cattle, all nicely groomed, you cannot but feel admiration for their appearance.

Mr. Ness has pretty well solved the sanitary milk question. He hauls the absorbents he uses something like seven miles. He uses saw-dust. The most minute attention is given to the little points. After being in the stable some time I noticed that some of the cows were standing forward and others standing back. I could not imagine the reason so I asked him about it. He said, "Just notice the fore feet of the animals standing forward." Under each cow's fore feet there was a mat. When I looked at the cows that were standing back I noticed that they did not have that mat. I asked him to explain the reason. He replied, "I find that animals standing on a cement floor get tired in the front feet as the floor is hard on the feet. When I happened once to put some sacking under their feet I noticed that they enjoyed it and stood forward. Later, I found that these mats were cheaper and I purchased them. These animals that have mats are the most valuable ones. It is the animals that have not got mats that step back into the gutter."

These cattle are groomed regularly. Mr. Ness says that the cows enjoy the grooming about as much as they do their meals. Before the man who grooms them gets to them, the animals will stop eating and wait for him to come to them. He claims to have no trouble with the hired help question. Mrs. Ness told me that it often was hard to get the men out of the stable, because they like to stay with the animals. Frequently they got trips to exhibitions with them.

Mr. Ness has a good water system in the stable. Recently he won numerous prizes on his stock at Seattle.

Sometimes we find farmers who have fine herds of cattle but the rest of their farms are not well kept. Mr. Ness entered one of the prize farm competitions in the Province of Quebec and his farm won the gold medal over 22 counties, and as these are the leading counties in Quebec I do not think anybody will question but that his farm is the best farmer's farm in the Province. Mr. Ness farms with his head. He is observant, and as he travels around if he notices anything that is good he goes home and puts it into practice on his farm and that is one of the secrets of his success. Mr. and Mrs. Ness have just completed building a new house. It was planned from beginning to end by them. It is the most unique house I have ever seen. It is extremely well laid out, well lighted and I hope before long it will be possible to publish a description of that house.

We have in Ontario many successful farmers. Most of our successful farmers stay right at home and attend to business, and therefore we do not hear much of them. This is why we thought it would be a good idea to hold a prize farms competition in Ontario, so that we could find who are our best farmers and their methods.

This Association was represented on the committee of management by Mr. S. R. Wallace and by Mr. D. A. Dempsey, and we arranged to divide the Province into four districts. Western Ontario was divided by a line running from Goderich to Hamilton. This district was No. 4. Just here I would like to bear testimony to the assistance we received from three or four public-spirited men. Our expenses were about $1,500. Dr. Jas. W. Robertson, of Macdonald College, volunteered to give us $250, Mr. Henderson of the Canadian Salt Co., Windsor, gave us $200, and the De Laval and the Empire Cream Separator Cos. each gave us $200. This assistance made the holding of the competition possible. We had entries from one end of Ontario to the other. The contest was well advertised through the agricultural societies and dairy instructors and through the press. The fact that we had entries from almost every county in the Province shows that the announcement of it was pretty well spread.

To-night we are to have the presentation of some of these prizes. It happens that I know a few of these men. In district No. 1 the winner was Victor Begg, of Moose Creek. Mr. Begg is a man who went on his farm when there was just about five acres of cleared land, the rest being brush and swamp. To-day the farm is declared to be the best farm entered in the contest for the district east of Kingston. He has cleared it and under-drained and fenced it and has fine buildings and it is well stocked. Mr. Begg has become quite a wealthy man and he has done it all out of farming. In district No. 3 the first prize was won by Mr. D. Duncan, of the Don, who went through much the same experience. Mr. Duncan has made a success of his farming operations by intelligence and hard work.

In district No. 4 the winners were J. W. Richardson, of Caledonia, R. A. Penhale, of St. Thomas, and R. H. Harding, of Thorndale. We have all three of these gentlemen here to-night and I hope that we will be able to get a little information from them and I feel sure that we will succeed. In this competition all branches of the farm were included. Points were given for the house, including its plan and finish, the orchard and garden, the furniture of the house, library, etc. Every branch of the farming operations was taken into consideration. I thank you for the close attention you have given me and I hope that you will be able to derive considerable information from the gentlemen who are to speak to you to-night.

ADDRESS.

By George A. Putnam, Director of Dairying, Toronto.

Some few years ago I graduated from practical dairying to that revolving armchair to which Professor Dean has referred. Probably it is a good thing that you do not require many of these armchair dairymen. It is necessary to have a few, however, as all features of the work must receive attention, and each must do his part as thoroughly as he is able to. We believe that to carry out the wishes of the people so far as legislation and so far as expenditure of money are concerned is an important part of the work.

It is gratifying for me to know that from all over the Province we are getting reports of decided advances along dairy lines, especially during the season of 1909. We have it from our chief instructors who are in close touch with the business at all seasons, and the dealers in Montreal say that the advance in the quality of cheese is more marked in 1909 than in any previous year. The producers have advanced and the owners of the factories have made advances, and the makers, we believe, are becoming more and more proficient in the very important part which they have to play in this industry. The producers are advancing in two or three different ways; we have decided evidence in the reports for the past season that greater care is being shown on the part of the producers in the selection of the individual cow and also in the care of that cow, not only in her feeding, but in the care which is so essential to keep her in the best condition. One of the strongest evidences which I have of advancement along this line is shown in the fact that during the past summer there has been erected in Ontario by dairy farmers over 1,500 silos, and in Eastern Ontario alone over 1,000. That means the farmers are going to be able to furnish their cattle with succulent food, which is so essential to their economic feeding. In the care of the milk it is generally admitted and favourably commented upon that the farmers are taking greater care of the milk. They are not only using more cleanly methods, but they are cooling the milk properly. The owners of factories are showing their confidence in the future of the industry by spending money to properly equip their factories in order that they may have suitable places in which to manufacture this milk, which is delivered to them in much better condition than formerly.

When I came to the Department of Agriculture, some six years ago, we were much concerned in devising means whereby we could induce owners of factories to ask for instructors. Now the instructors are sought for and cannot go to all the places which apply as often as desired. There is a co-operation among the producers, owners of factories, and instructor which we are all glad to see. The makers are taking a greater pride in their business; and if we are to judge of the importance of the profession of dairying by the amount of knowledge required to make cheese of the quality now demanded by the market we must conclude that the makers are worthy of self respect. I remember the time when apparently the average maker thought it necessary that he should make a few poor cheese during the season in order to supply the home market. That day has passed.

Probably I was unfortunate in suggesting to the Secretary that I would say something regarding the future of the dairy industry. You expect that I will tell you what the future of this industry is going to be. I can only do that by asking you to what extent you are going to co-operate with each other. If you can tell me to what extent the owners of the factories and the makers will take advantage of

the opportunities which they have, I can tell you something of the advance which we may make in the future. If you can tell me as to whether or not the farmers generally are going to have some definite object in view in carrying on their dairying operations, then I can tell you as to whether or not we are going to have an increased production per cow. Although we have been teaching the farmers at institute meetings, at the Agricultural College and through the press, what are considered the best ways to build up their dairy herds, the fact remains that in many sections of this Province the average production of the dairy cow is very little better than it was many years ago. In some sections we know there has been a marked advance in the production per cow, but the results in many sections are disappointing and discouraging to us, who are sending out speakers through the length and breadth of the Province. Although the farmers have been given instruction along herd improvement lines many of them have no definite object in view. If we could only induce the farmers to follow out some definite system, there are very few who would not use good judgment in deciding upon that system; but there is a lack of system, a failure to look into the future, and we appeal to the farmers to have some definite object in the breeding of their stock.

We have heard from Professor Dean and Mr. Ruddick this afternoon that you must improve the quality of the cheese if you are going to get a high price, or, on the other hand, you must offer the farmers a higher price if you are going to get a better quality. You deserve the higher price, but do not lose sight of the important factor which is more immediately under your control, a lessening of the cost of producing the milk. If you lessen the cost of production as some have done, you will reap a greater profit than you can hope to get in the near future in an increased price, and you are well fortified for lower prices if they should happen to come. The difference between the average production of the cows of Ontario and the possible is altogether too great. We hear of some farmers making very large profits, and a few who are making very fair profits, the majority are not making more than a living wage and what I want to do this afternoon is to impress upon the farmers the advisability of making a closer study of their own possibilities. We may continue to send speakers to you but unless you take advantage of the opportunities that you have for self improvement we will not get the advance that we hope to see. Why don't the farmers form local clubs or take greater advantage of the Institute meetings, and why don't they attend factory meetings in larger numbers? If you listen to the addresses on Agricultural topics or read the Agricultural press from year to year, you will notice that to a certain extent it is a repetition of the old story. No matter what theory we advance or what instruction is given the value of it is going to depend in a large measure upon the extent to which the information is applied to local conditions and how are you going to apply these theories and undisputed approved methods to local conditions. unless you can induce the farmer to take part in the discussion at Institute meetings and in their local clubs. We trust to see the club work extend greater than in the past. Professor Dean has referred to the fact that these conventions consist too largely of speeches, and not enough of discussion on the part of the makers. We consider that an Institute meeting or any sort of agricultural meeting gives the best results when there is free discussion.

I was talking to a fruit man in my office the other day. He is looked upon as the leading fruit man in Eastern Ontario. We sent him throughout this province from Huron to Glengarry, to give the farmers advice as to where to place their

orchards and how to take care of them, and he is recognized as one of our best authorities. He told me that two or three years ago he considered it wise to cut down three or four acres of his orchard. It looked to be a very good orchard for a few years, but he found out that this certain section of his farm is not suited for the growing of fruit. He had planted his trees on this part and sprayed, trimmed, and cultivated for several years before he found out that the soil was not satisfactory. It was too shallow and the trees had not the desired vitality; so he took his axe and cut down the trees. When we find such varied conditions on one farm, it impresses us with the fact that farmers should be students and they should study their own conditions very carefully.

The owners of factories are for the most part building on a substantial basis, which shows that they have faith in the future of this industry; and we must join in that faith if we are to believe what the Commissioner for the Dominion has said. The high price for all lines of farm produce is likely to continue, especially for dairy products. The people are coming to appreciate the fact that butter and cheese and milk are the cheapest foods we have. The United States are lowering their tariff in order to get our cream, and I think they will soon reduce the tariff so that they will be getting our butter and cheese. We will have ever growing markets in the United States and Canada which will do much to insure an increased price for dairy products. Doctor Publow told me in Belleville last week that they are making a special soft cheese in the Dairy Department of Cornwall University, where they have a business of $25,000 per month, which gives a gross return of $8.00 for every 100 pounds of milk. This is a comparatively new line for this continent, and I believe we will find many new avenues for our dairy products. City people are asking for pure milk, and when they get it pure they will take it in larger quantities, even if they have to pay a higher price for it.

It has been suggested that we license factories in Ontario. We have discussed this matter for several years, but we could not formulate any method which we thought would work out satisfactory. If we license a factory, that license would have to be based upon some definite standard, and any standard to be of value agreed upon would put a great many of the present factories out of business, and we cannot afford to close up establishments built and equipped by private capital. We had to do the next best thing; so we have asked all the dairymen of the province to register their factories. We cannot very well refuse registration to a factory already established, but any new factory that is going to be erected, or any that is going to be rebuilt, will require to be approved of by a representative of the Department of Agriculture so far as sanitary conditions and equipment are concerned. This is the small end of the wedge and we believe some good is going to come from it. The certificate of registration is merely a formal acknowledgment that the factory has been registered with the Minister of Agriculture. We believe this is the beginning of a system which will eventually materially assist in putting the business upon a better basis. When the owners properly equip their factories they will demand that the makers shall be better qualified. If you go to the expense of putting up a good factory, you have the right to demand that the maker be well qualified for the duties which he is asked to perform. We are glad that the owners are placing themselves in a position to demand the service of well-qualified men. I have sometimes wondered how some owners, with dilapidated factories could approach a man who is qualified and ask him to make cheese in that factory. We believe that the outlook for the maker is brighter than ever before. The granting of certificates to the maker is going to place them in a stronger position and will be a protection to

the well-qualified men. Very often the man who has been one season in a factory will go to a proprietor and state, "I am qualified to take charge of your factory and will make cheese for 15 cents less than the man you now have," and the proprietor thinks he is saving so much money, but probably he will find later that it would have paid him in the long run to give that man $50 to leave the country. We are going to grant certificates to makers who have had charge of a factory for one year or more, or who has been a chief maker for one or more seasons, and is recommended by his employer and the special committee. Beginning with 1911 we will grant certificates to all these men, and any person who has not had charge of a factory or been a chief maker previous to 1911 will be required to get practical experience in a factory before he will be given a certificate. The regulations will be such that it will be to the advantage of every man who wishes to secure a cheesemaker's certificate to attend a Dairy School. We shall not grant certificates to men because they attend dairy school and pass the examination. Such a course will assist them in this way: they will be in a position to get a permit or authority from the superintendent of a dairy school to take charge of a factory. He will work under that permit for one or two years, but he must show that he is a capable man before he will be granted a certificate from the dairy school. The regulation for some years has been that the man who takes a dairy school course must comply with certain regulations before he will be granted a diploma. Some of you will say that we will shut out the man who does not want to go to the dairy school. No person will be refused a certificate if he is a capable man. The Minister will have the right to grant certificates; and if a man is capable he will be given a certificate. Special cases will be considered by a committee and no person will be done an injustice. I think the dairymen have faith in the Dairymen's Associations and the Department of Agriculture. The dairymen have faith enough to know that we are not going to do anything which is unjust. A great many were afraid when we passed the sanitary law that some of the factorymen were going to suffer an injustice at our hands. I do not think, however, that any man claims that he has been unjustly dealt with. We have been criticized for having been a little too lenient in dealing with some of the men, who have not lived up to the regulations. We shall be liberal to start with, but must draw the line tight enough that the average standard of makers in Ontario will be higher than it is to-day.

Dr. Publow tells me that he believes there is no country in the world that has such efficient makers as we have in the Province of Ontario. (Applause.) He says our cheesemakers are an intelligent, competent lot of men. You must be intelligent, wide-awake men to shoulder the responsibilities which rest upon you. You have to keep on the watch; it is a trying business and a business which should command a higher salary than the average maker is getting.

I trust the makers will take advantage of the opportunity which they have of assisting a little more in improving the quality of the milk. We are sometimes quite discouraged when we consider what has been done for the producer, and the comparative slow advance along improved lines. We have sent out some sixty-five thousand leaflets on the care of milk and cream each season for several years. We have issued long circulars and short circulars and have tried in every way to keep something before the producers which would appeal to them. In spite of all this, I think you will find in most of the factories only a few men who ask, "How can I deliver the milk to the factory in the best possible condition?" A larger number by their actions say, "How bad can that milk be and still be accepted at the

factory?" I trust that the makers will make it their business to get out among their patrons and let them know that they are anxious to have the milk kept in better shape.

I judge that Mr. Publow told you this morning something of the increased returns from milk which is properly taken care of, as compared with that which is improperly handled. A factory in Eastern Ontario making 12 cheese a day, was visited by the Instructor who made the cheese the first day of his visit, and got a certain number of pounds of cheese; then he got the producers to take good care of their milk for a couple of days with the result that they made sixty-seven pounds more cheese out of the same quantity of milk, and the quality of that cheese was better and commanded at least half a cent a pound more. As a result of these two days' work the increased return was thirteen dollars and some cents, and that means $13.00 profit per day.

We trust we may continue to see this co-operation among the producers and the owners; you are all in the same business and what is in the interest of the maker is in the interest of the owner. Let us put our shoulders to the wheel and make for the betterment of this growing dairy industry of Ontario. (Applause.)

The Chairman: It is customary toward the close of the convention in the different cities where we have met, at this stage of the programme, for the President to vacate the chair and introduce to the audience the new President, who will occupy the office for the ensuing year, and it is my privilege this evening to introduce to the audience the President-elect of the Western Ontario Dairymen's Association of Ontario, and I bespeak for him a pleasant year. I know that he will be surrounded with a corps of efficient, earnest workers in the Board of Directors, and that they will be backed up by the entire Association. The new President represents the creamery part of the work. Previous to my election to the office it was occupied by a man who represented the cheese side. I do not know why it fell to my lot or honor to be selected to occupy this position. I represent both branches of the industry, the cheese and the butter. The new President-elect, Mr. John H. Scott, of Exeter, is a man well developed physically and mentally and socially, and well qualified to fill the office as chairman of any convention. It affords me a great deal of pleasure to call upon Mr. Scott to take the chair.

Mr. John H. Scott: I can assure you I feel very highly honored after the very flattering introduction that I have received from the Past-President, and I appreciate it very much. I also appreciate the honor that has been conferred upon me. It is some twenty years since I first began to attend the conventions of the Dairymen's Association of Western Ontario, and when I look back on those twenty years and read the distinguished names that we find on our programme, I have been led to ask the question, "Am I qualified to fill that responsible position?" I feel that it is an important position. We represent an Association that takes one of the foremost places in our agricultural interests to-day, and I feel that I am occupying a responsible place. I want to thank the members of this Association for placing me in this position, and I only hope I will be able to fill it as worthily, and with as much dignity, as the past President, and all the gentlemen who have had the position before me. Without further remarks we will proceed with the programme. (Applause.)

SANITARY MILK.

By Findlay G. Macdiarmid, M.P.P., Aldborough.

I am here to-night to show my good-will towards the Western Dairymen's Association, and to contribute in some slight measure to your gathering here this evening. I am pleased to meet with a body of men identified with such an important branch of the agricultural industry, and one that is doing so much to lay the foundation of the great national structure that we are building on this continent. I have heard some men say that our position with regard to the dairy industry is somewhat threatened at the present time by competition from New Zealand. This industry has been built up through slow years of noble endeavor, and I do not believe the people of Canada are afraid of competition. They welcome it, no matter from what country, so long as that country is prepared to pay fair wages to the men engaged in that industry. I do not believe our position in the old land will be seriously threatened. The pluck, intelligence and energy of the Canadian people is equal to any emergency that may arise. The dairy industry requires a great deal of intelligence to maintain. To-day it requires a comprehensive view of the whole situation, and a knowledge of sanitation, greater than it ever required before in the history of the dairy industry. If our cheese trade abroad and at home is to be kept in the proud position it occupies at the present time all the rules with regard to sanitation must be thoroughly observed by the dairymen. Perhaps in this northern climate we have paid too much attention to providing warm stables, and have neglected light and ventilation, and this is a question worthy of our consideration. It lies at the foundation of this great industry, and it is a question that must be faced squarely by the people of this province and of the Dominion of Canada. During the last session of the Ontario Legislature you will remember that the question of the dairy and milk supply was raised and an agitation sprang up in the city of Toronto. The matter was brought to the attention of the Legislature, when it was deemed advisable by the Government to appoint a Commission to examine into the production, distribution and transportation of milk in the Province of Ontario, and I had the honor to be appointed on that Commission. To-night I find myself in an embarrassing position. The report which is in the course of publication, practically compiled at the present time, has not been presented to the Legislature, and consequently I am not in a position to speak along the lines of that report, or to make known any of the conclusions we have arrived at. In connection with that I just wish to read a paragraph that struck me somewhat forcibly. It is published by the United States Agricultural Department, and is written by Edward H. Webster, and these are his introductory remarks: "It is evident that in nature's scheme for the nourishment of the young, milk was never intended to see the light of day, and if sucked from a normal healthy animal it is perfect food for the offspring. In this natural method of nourishment there is little possibility of contamination from outside sources. Since an artificial method of drawing milk is resorted to, however, there enters a study of conditions entirely new and different. The milk then comes in contact with the air, or the vessel into which it is drawn, and with particles of dirt from many sources." That paragraph struck me as containing the essence of the milk question from the sanitary point of view. In the model dairies of to-day where the question of sanitation is thoroughly understood great care is exercised in the milking of the cows and in the production of this high quality of milk. During the time the investi-

gations were carried on, it was necessary to cross to the American side in order to compare how the milk supply was handled there in cities of similar size compared with the city of Toronto, and we visited the cities of Rochester, New York and Chicago. In the city of Rochester we had an opportunity of driving out and seeing the work that is carried on at the Tulley Farm. These men are engaged in the salt industry, and rather than fight a law suit over the overflow of salt wells, bought up a large tract of land near the city of Syracuse. What to do with that land was the question that faced them, and they decided to start a model dairy, and there we witnessed one of the highest possible sanitary conditions. We were there during the operation of milking. It was a dusty day when we arrived, and it was necessary that we should put on linen coats. Before milking was commenced the cows are all sprayed. The floors were flushed with water in order to keep down bacteria; the milking stools upon which the men sat to do the milking were sterilized; the suits of clothes they wore were sterilized; they rejected the first drawing of milk in order that any bacteria that entered the teat during the daytime would not get into the milk; and in that way they kept the bacteria down to a very low degree. The milk was immediately removed to a cooling room, and inside a quarter of an hour was cooled. The great secret in the production of milk is cleanliness at the source of supply; care in the transportation and handling of it, and the immediate cooling of the milk after being drawn from the cow. These are the questions which must govern the milk supply. A chain is no stronger than its weakest link, and no matter how careful you may be at the source of supply, no matter what care is taken, if it is not properly cared for in transportation it becomes contaminated and will deteriorate in value. Supposing it is properly handled in transportation and placed in a home where they are indifferent and put it in a kitchen at a high temperature where it becomes warm or in a pantry which has pickles in it or other food, milk is very susceptible, and soon becomes contaminated. An educational campaign that will improve the product of the milk and place it on a higher quality and place it on the market in a better shape will improve the cheese industry and every phase of the dairy question. Never before has the milk problem loomed so large; never before were people taking such active and intelligent interest in this question as at the present time. We must all admit the fact that a large percentage of children born to-day are fed on the bottle with cows' milk, and the cause which underlies this is the inability of women of the present generation on this continent to nurse their offspring; but that is not a subject I am going to discuss. It is a subject that is under investigation, and on which men hold divergent vews; but I am satisfied of this, that it is not unwillingness on the part of the mother but inability. We have to depend on cows' milk to raise a large percentage of the children that are born on this continent at the present time, and for that reason I say that the milk question is a very important one. What are they doing? Take the city of Rochester. Their pure milk supply is of world-wide renown. At the present time, through the efforts of Dr. Goler, they have established a milk depot. His object was to reduce the infantile mortality in the city of Rochester. The loss of life was appalling between the ages of one and five, and with a view of lessening this mortality, he undertook the controlling of the milk supply during July and in the warm months of the year. For these purposes he went out and made arrangements with the farmers to purchase the milk at the farm, and he engaged two trained nurses to go out there and take care of it. He erected temporary quarters in which they could care for the milk, and the milk was

bottled under the supervision of these nurses and shipped in and distributed among the poor parts of Rochester at a nominal cost. Figures alone will tell you the result. It was about nine years ago since the work was started, and I have here the report of the work written by him. Prior to the time this system was adopted, of children under one year of age and under five years of age from 1888 to 1896 there were 6,629 deaths. For a similar nine year period, from 1897 to 1905 there were 4,403 deaths, a diminution of over 30 per cent. These figures represent deaths from all causes, and not merely those from intestinal diseases, so you see a falling off of over 30 per cent. under the simple process by which Dr. Goler was supplying clean, pure milk to the city of Rochester. Perhaps it would be unfair to say that it was all due to the milk supply. There was an educational campaign in connection with this work. These trained nurses when handing out the milk also disseminated useful knowledge to the mother as to the rearing of children.

The greatest asset we have in this country is our people and their character, and we want if possible to preserve the life of every child we can, and I think the infantile mortality of the province of Ontario is something that may well be looked into. It ought to be examined and must be examined in the light of the returns of the registrar-general. These returns are made annually by the different clerks in the different municipalities and they reveal a state of affairs which is not to the highest credit of the Province of Ontario. Here is an opportunity for philanthropists who wish during the hot months of the year to spend some of their money in saving the lives of children. I believe it is possible to do something along this line that will be of great benefit and enjoyment to those who undertake it. A start has been made in the city of Toronto along the lines that they are working on in Rochester and a similar start has been made in the city of Hamilton. During the present year they have gone out to the farms equipped with cooling stations alongside the dairy where the milk is carefully prepared and put into bottles for the purpose of being distributed to the children.

It has been said here to-night that never before within the memory of those present have conditions on the farm been as favorable as they are at the present time. I do believe that the outlook for the future is just as good as are conditions at the present time. Never before were there so many people living in the towns and cities who have a desire to return to the land; never before were there so many as there are at the present time who have bent their minds in that direction. Now is the time to act; now is your opportunity. It will never take less money to get located on a farm than it will at the present time. Conditions are improving, and the outlook for the farmer is exceedingly bright at the present time. We have at the south of us a great progressive nation—a country with enormous resources, and they are fast reaching that point in their development where their supply is quite equal to the demand. Their production is not equal to their consumption, and they are standing on the verge of being an importing country in many of the lines that Canada can grow successfully. With that market opening up before us I see no prospect of a lowering in price in any of the leading lines of agriculture that are being carried on in this country at the present time, in the Province of Ontario. I believe we have been too modest in making known to the world our own great natural resources. Men on the platform who are able to express themselves have pictured the great resources of this mighty Dominion. They have pointed to the great stretch of prairie in the west; they have followed province after province, from ocean to ocean, and the great west has been held out as the great opportunity for young men with small capital; but,

I do not believe there is a province in the Dominion that has opportunities equal to those presented to a young man in the Province of Ontario, whether he be possessed of small capital or great. The supremacy of our position in confederation is not seriously threatened. We have great agricultural resources in the Province of Ontario. We have in this province great natural resources that are not yet fully realized or understood. Every day brings fresh discoveries of minerals in our northern land, and in addition to the minerals we have a great agricultural tract of land which affords great opportunities for the man with small capital, and who is willing to work. There is employment there all the year round. Cutting pulp wood in the winter time will pay for clearing the land. I wish to make this statement with the permission of the gentleman who made it. The Chairman of the Temiskaming and Northern Ontario Railway Commission, Mr. Englehart, was talking to me last night with regard to the prospect and the splendid showing that the Temiskaming and Northern Ontario has made during the past year. I said to him, "I presume your showing is due largely to the traffic in connection with mining affairs in that country," and he said, "The time is near approaching when that Government-owned railway will be a paying proposition from an agricultural point of view." Is that not a startling statement to come from the chairman of that road, a man familiar with that part of the country, to think that there are agricultural resources enough up there to make that Government railway a paying proposition?

Let me say in conclusion that there are many phases of the dairy question that interest us as a people. The highest results and the greatest achievement can only be attained through co-operation. Let us all unite, no matter in what walk of life we are engaged, to co-operate, the producer with the distributor, and the distributor with the consumer. Let all co-operate to provide the highest article of food in cheese and butter and milk that it is possible for any country to produce. We owe it to our children; we owe it to the great resources of this country; we owe it to the intelligence of the Canadian people.

THE CHAIRMAN: We come now to a very important part of our programme. I would ask the following gentlemen to come to the platform: Mr. J. T. Donnelly, R. A. Thompson, and J. E. Stedelbauer. To the generosity of some of the people interested in dairy supplies, the Association has been able to award some of the prizes. I have much pleasure in calling upon Mr. J. D. Brodie, ex-President of the Association, who will present these prizes.

MR. JOHN BRODIE: I am sure I express the sentiments of all present when I say that the task assigned to me on this occasion is a very pleasant one. I think it has ever been the custom, when any person has displayed superior merit or ability, that some token should be given as a reward for their genius, that the public may know of their merit and give them that honor that is justly theirs. The gentlemen who are to be recipients of these beautiful prizes this evening have attained to the highest distinction which it is possible for a cheese-maker to attain, and it is right that we should honor them for the reputation which they are making. We should also honor them for their character. I think it is true that every manufacturer puts just so much of his character into the goods which he produces. Then I think we should honor them for their example. They have given us an example of the ideal to which they wish to attain and that ideal has been perfection. I might just say we are all very sorry that Miss Morrison will not be here to be presented with her trophy. The speaker then presented the various trophies to the winners, with suitable observations.

The three recipients in turn briefly responded.

THE CHAIRMAN: I would like to say of these men who have won these prizes to-night, that two of them have held the trophy for a year, and Mr. Thompson has been one of the largest money winners. Last season he won at London Toronto and Ottawa, and he also won again at our Winter Fair.

Mr. Arkell, manager of the Imperial Bank, spoke of the pleasure it gave that institution to donate the silver cup for a prize.

THE CHAIRMAN: We have another very important item on our programme and I will ask Mr. J. W. Richardson, Mr. Richard Penhale and Mr. R. H. Harding to come up on the platform. In this section they are the winners in the dairy farm competition, and I have very much pleasure in calling upon Mr. Ruddick to make the presentation to these gentlemen.

MR. RUDDICK: I am sure that it is a very pleasant duty assigned to me, making the presentations in connection with this farm competition. I know something about farm life. I lived on a farm until about thirty years ago, when I came to live in St. Thomas, and I lived in this city for two years. The man who wins a competition among farms in Ontario wins no small honor. It has been my privilege to travel a good deal, and I have been in almost every State in the Union, and in a great many portions of the continent of Europe; and while in the older countries like England and Scotland, they have conditions not comparable with the conditions in the new parts, yet I want to say, without any boasting, that I do not know of any agricultural community where the people are depending on the land where you will find better homes, better buildings, and a greater air of comfort than you will find anywhere in this province. And I do not know any part of the province that is better than this particular district.

We are indebted very largely to the energy of Mr. Cowan, editor of the *Farm and Dairy,* for the origin of this work and for carrying out the idea. Mr. Cowan, I think, deserves great credit for what he has done in that connection, and I only think that that should be made plain. The first prize in this competition in District No. 4, was won by Mr. J. W. Richardson, of Caledonia. He had a total of 846 points out of a possible 1,000. He has the highest score on buildings, the second highest on live stock, and considerably the highest on crops. That seems to be a very creditable record. The second prize was won by Richard Penhale, of St. Thomas, with a total score of 814 points. He is the highest on the house. One particular feature of this house is that it has a most up-to-date water system, and if more houses had such water systems it would make life easier on the farm. The third prize was won by Mr. R. H. Harding, of Thorndale. He was tied with Mr. Shearer, of Bright, on farm management. This is a very important consideration and deserves a high place. The speaker then presented the prizes.

MR. RICHARDSON: I am sure we thank Mr. Cowan and those connected with this prize competition. When we entered into it we did not expect to be winners, but we did so with the intention of doing the best we could. I do not consider that it is at all due to my efforts that I have won the prize. We have what is known as the Riverside Farm, some distance from Caledonia, and it is some forty years since my father bought it. He was one of a large family, and necessarily when he started out his funds were low, and he had to buy as cheap a farm as possible, and he selected this one. It had been pretty well run down. At that time there was a great deal of navigation on the Grand River, and wheat and barley were grown for a great many years. When he got the farm it was badly run down, and the

point he aimed at was to build it up and make a home for himself. Since that time the farm has been built up and one of the items in the building up of the farm was his attempting to grow lucerne or alfalfa. The first four or five years it was almost a failure, but he continued at it and now for a number of years alfalfa has been grown successfully. At first it was grain growing, and then beef raising, but the profits from beef were very low. About twenty years ago we began weighing our milk and selecting our cows in order to start up a dairy herd. For a number of years we continued the home dairy, and it is only during the last three or four years that we have been sending to the factories. At that time more land was required, and I think one reason why we adopted dairying more extensively was because it was necessary to specialize. We had a very good idea of what our cows were doing, and by weeding out the poor ones we secured a herd of cows that gave us profit. One of the great things in dairying is that you increase the fertility of your soil, and by so doing are able to feed two cows on the same land that used to feed only one. The main feature of our farm is the cheap production of alfalfa clover, roots and ensilage, and that is the way in which we think we have lowered the cost of production on our farm to a great extent and by doing that our profits have been immensely increased. (Applause).

Mr. Richard Penhale: I am sure it affords me a great deal of pleasure to be here to-night. It is with a degree of gratification that I bring this trophy to the township of Yarmouth, one of the pioneer townships of Ontario, and I am proud that my feeble efforts have been instrumental in bringing that about. I presume you want to know how we did the trick. I have conducted my farm on a principle of my own. A good many things that I have undertaken have been criticized very severely by outsiders. My farm comprises 100 acres of land adjacent to the city of St. Thomas; it is about two miles and a half from the city. It is divided into eight fields, five fields of 15 acres each, and two fields of 10 acres each, and one field of 5 acres. On the first three fields I conducted a three years' rotation and that has been in operation for over seventeen years—corn, grain, and hay. Two fields are in permanent pasture—native blue grass. One field of ten acres is an apple orchard, and on another field of ten acres I am raising alfalfa. Five acres contain the buildings and garden and a few small plants. Upon this farm I maintain 40 head of cattle on an average, from five to seven horses and from ten to forty hogs and one hundred head of poultry. This is the plan on which I have managed my farm for the last number of years, and I presume that it is the only course I could pursue to land this magnificent prize that has been given through the generosity of *Farm and Dairy*. We have a great many things to contend with. We are required to have better sanitary conditions. We have discarded the line-fence controversy to get away from the lawyers. (Laughter and applause). We have adopted a system of weighing our milk to find out the cows that are giving the best returns. We are engaged most largely now in supplying cream to the city of St. Thomas, and we find that to be one of the best propositions of the dairy industry at the present time. We are also able to raise quite a few hogs.

Mr. R. H. Harding: It is not necessary for me to tell you that I am proud to be a winner in the Dairy Farm Competition, although I will say that it was brought on in such short notice that I did not have much time to do any fixing up. I may tell you that I did not spend a dollar that I would not have spent if there had not been any competition. Right here I would like to thank the *Farm and Dairy*, and especially Mr. Cowan, as manager of that paper, for starting

this good work. I do not think there have been many things started in this province that have done so much good as this competition is going to do. I am glad that they very wisely spread the influence of this competition over the whole province. My farm is just 97 acres, and I did not notice until Mr. Ruddick was speaking of it, that I just compared with Mr. Shearer. We are the highest two in farm management, and I also notice that I am the highest in the whole district in light and ventilation in my stable. I pin my faith to clover and alfalfa for keeping up the fertility of the farm, and supplying cheap feed together with the roots and silage. My farm happens to be four times as deep as the frontage, and that means a narrow farm. In order to economize in labor I run two systems of rotation. On the back half I run a two-year rotation, that is, I seed down all my white straw crops with clover. The balance is a three-year rotation, corn following the meadow and roots and grain and clover. I sow very little timothy—just enough to feed the work horses for farm work.

REPORT OF RESOLUTION COMMITTEE.

Whereas the success and educational value of this Convention is due to a marked degree to the splendid addresses given by the various speakers, we desire to express our appreciation of their efforts and extend to them our sincere thanks for their assistance.

That we, the members of this Association, desire to express our appreciation of the kindness of the Mayor, Council and Board of Trade in furnishing the free use of the Engineer's Building for the Convention and Dairy Exhibition, and we also wish to express our thanks to the citizens of St. Thomas for the kind reception they have given us.

That the thanks of this Convention is extended to the press of St. Thomas and other cities for the excellent reports given by them of this Convention.

That the thanks of this Convention be and are hereby tendered to the Canadian Salt Co., of Windsor, Ont., through their General Manager, Mr. E. G. Henderson, for the very handsome badges presented by the Company to the Association.

That the thanks of the members of this Association be and are hereby tendered to the Heller & Merz Co., New York; R. M. Ballantyne, Ltd., Stratford; C. H. Slawson & Co., Ingersoll; J. B. Ford Co., Wyandotte, Mich.; The Canadian Salt Co., Windsor; The Western Salt Co., Mooretown; Ryrie Bros., Toronto, and the Imperial Bank of Canada, for the special prizes kindly donated for our Dairy Exhibition.

That we feel as dairymen we are under great obligations to the Ontario Department of Agriculture for the assistance they have rendered the dairy industry, through the system of instruction that has been given, and also in providing speakers to attend annual meetings of cheese factories and creameries.

Upon motion of Mr. Waddell, seconded by Mr. Parsons, the foregoing resolutions were adopted.

The Convention then adjourned.

REPORTS OF THE DAIRY SCHOOLS, 1909-10.

THE ONTARIO AGRICULTURAL COLLEGE, GUELPH, ONTARIO.

Staff of Lecturers, Demonstrators and Instructors.

H. H. Dean, B.S.A. ..... Professor, Dairy Husbandry.
R. Harcourt, B.S.A. ..... Professor, Dairy Chemistry.
H. L. Fulmer, B.S.A. ..... Demonstrator, Dairy Chemistry.
S. F. Edwards, M.Sc. ..... Professor, Dairy Bacteriology.
D. H. Jones, B.S.A. ..... Demonstrator, Dairy Bacteriology.
R. W. Stratton ..... Instructor, Cream Separators.
G. R. Taylor ..... Instructor, Milk and Cream Testing.
Alex. McKay ..... Instructor, Cheesemaking.
C. H. Ralph ..... Asst. Instructor, Cheesemaking.
F. Dean ..... Instructor, Buttermaking.
Miss Laura Rose ..... Instructress, Farm Buttermaking.
M. Robertson ..... Instructor, Farm Dairy Milk and Cream Testing and Farm Cream Separators.
F. G. Rice ..... Instructor, Soft and Fancy Cheesemaking.
G. Travis ..... Instructor, Piping, Soldering, Boilers and Engines.

The Dairy School term opened on January 3rd, for the regular long course in factory and farm dairy work, and closed on March 23rd. The total registrations during this term were 53, of whom 32 registered for the full factory course, and 30 of these wrote on the final examinations; ten registered for the Farm Dairy, of whom two wrote on the finals; one of those from among the twenty girls of the Macdonald Institute who took farm dairy work during the term wrote on a part of the final examinations, making a total of 33 who remained throughout the term. In addition, four students registered for the soft and fancy cheese work, and seven registered for special work in one or more branches of the term's work. We have quite a number of students each year who cannot remain the full term, but who come for a short time to gather information on some special point, such as bacteriology, milk and cream testing, etc. Many of these are students who have taken the course previously, but wish to keep in touch with Dairy School work.

A few of the students were starred in one or two subjects, which means that they will have to pass a supplemental examination in these subjects before their diploma will be granted.

Instead of issuing "A Certificate of Standing," as has been the custom in the past, the results of the examinations are being mailed to the students on a form like the following:

ONTARIO AGRICULTURAL COLLEGE.

DAIRY SCHOOL EXAMINATIONS, 191....

FACTORY CLASS.

Standing of.....

The different grades are as follows:—(A) 1st class honors, 75%; (B) 2nd class honors, 60% to 75%; (C) Pass, 33% to 60%; (D) Failure, below 33%.

Subject.	Marks Possible.	Marks Obtained.	Grade.	Subject.	Marks Possible.	Marks Obtained.	Grade.
Dairy Lectures	100	.....	.....	Butter-making. Practical.....	100	.....	.....
Dairy Chemistry	100	.....	.....	Butter-making. Written.....	100	.....	.....
Dairy Bacteriology	100	.....	.....	Milk-Testing.. Practical.....	100	.....	.....
Cheese-making. Practical...	100	.....	.....	Milk-Testing.. Written.....	100	.....	.....
Cheese-making. Written....	100	.....	.....	Miscellaneous Subjects.. Boilers, Engines, Piping, Soldering, Mathematics, Book-keeping, Cold-storage, Veterinary	100	.....	.....
Cream Separators. Practical...	100	.....	.....				
Cream Separators. Written....	100	.....	.....				

Rank.....in Class of.....

....
Professor of Dairy Husbandry. President.

This is being done to prevent confusion with the "diploma," which is granted only after passing all examinations at the Dairy School, and after a student has been successfully in charge of a factory for at least two years, one of which must be after taking the Dairy School course.

So far as we can see, the recent legislation requiring all makers to have a certificate or diploma by January 1st, 1911, did not affect the attendance at the Dairy School term of 1910. It would seem as if makers are not taking the legislation seriously, or they are counting on receiving merit certificates which will enable them to comply with the regulation.

It has been suggested that the term should be made one of two seasons, taking up in the first year much the same work as at present, but leaving out the laboratory practice in dairy bacteriology and dairy chemistry. In the second term, which might be somewhat shortened, the work to consist of laboratory work entirely, including advanced work in milk and cream testing. If this is the wish of the cheese and butter makers, an effort would be made to comply with their request, although it would be difficult to do this with present accommodations. A new dairy building is needed, and also increased accommodation in the Bacteriological department. Our Farm Dairy quarters are very much cramped, and are very much out of date. New and better rooms and equipment are almost a necessity for our Farm Dairy students, of whom quite a number (20 to 25) come to the Dairy each year from the Macdonald Institute, and who are not included in the list of students credited in attendance at the Dairy School. About our only consolation in the past has been that it is neither the buildings nor the equipment

which makes a dairy school; it is the men and women who comprise the instructors and students. However, an up-to-date plant is an important factor in securing good results, and we would urge upon the authorities the need of a modern dairy building in keeping with the great dairy industry of the Province. The old building, in which are located the Farm Dairy and Cheese Branches, was built over thirty-five years ago, and is almost beyond repair. The newer building—erected in 1893, is too small to accommodate the classes. It is also badly located for drainage and in relation to the other buildings on the College Campus.

Short Courses for Instructors—Milk and Cream Testing.

In addition to the regular course of about twelve weeks, two short courses of one week each, both running concurrently, opened on March 28th. One of these is for the Instructors of Western Ontario, who visit the creameries and cheeseries regularly throughout the season. The course consists of advanced lecture work and laboratory practice in the Bacteriological and Chemical departments. The aim is to make this work continuous from year to year, so that a definite course will have been covered in a series of years. This is practicable, because the same men are employed as Instructors from year to year, to a large extent, although this year two new men are engaged for the coming season.

One day of the course was expanded into a Cheesemakers' Convention. Practical lessons in scoring cheese and butter were given in the forenoon by Mr. I. W. Steinhoff, Stratford. Lectures were given by Prof. C. F. Doane of the United States Department of Agriculture, and by Messrs. J. N. Paget, Canboro, and Frank Herns, London, Chief Dairy Instructor. Although the attendance was not large, all were much interested and profited by the lessons of the day. The addresses were particularly strong and calculated to cause factory men to think.

The attendance at the milk and cream testing course was disappointingly small. The instructors who are going among the creameries and cheeseries say that the majority of the makers are very much in need of the instruction which is given in this testing course, yet the response has been very feeble for the three years during which the opportunity to get practical lessons on testing has been offered. It seems doubtful if it will be advisable to continue a course for which there appears to be so little demand.

During the term Mr. C. H. Ralph, who has been Assistant Cheese Instructor in the Dairy School, and Demonstrator in Cheesemaking on the College Staff for a number of years, severed his connection with the College to accept a more lucrative position in commercial work in the United States. We take pleasure in testifying to Mr. Ralph's efficiency during the many years he has been connected with the Dairy Department of the College, and wish him success in his new field.

We were fortunate in securing the services of Mr. Alex. McKay, permanently in connection with our cheese work. Mr. McKay's years of experience as a practical cheesemaker and instructor among the factories, together with several years' experience as instructor in the Dairy School, will make him a valuable man on the Dairy Staff.

Two other members of the dairy instructors and demonstrators have signified their intention of engaging in commercial work at the end of the present year. If we wish to secure, and hold, good men it will be necessary to pay higher salaries than has been the custom up to the present.

H. H. DEAN.

EASTERN DAIRY SCHOOL, KINGSTON.

Director.

G. A. PUTNAM, B.S.A., Department of Agriculture, Toronto.

Staff.

G. G. PUBLOW ..... Supt. and Lecturer in Cheesemaking.
J. H. ECHLIN ..... Instructor in Cheesemaking.
D. J. CAMERON ..... Assistant in Cheesemaking.
L. A. ZUFELT ..... Instructor in Buttermaking.
J. BURO ..... Instructor in Separators.
W. W. DOOL ..... Assistant in Buttermaking.
J. F. SINGLETON ..... Instructor in Milk Testing.
W. T. CONNELL, M.D. ..... Bacteriology.
W. O. WALKER, M.A. ..... Dairy Chemistry.
J. A. CRAIG ..... Engineer.
JESSIE GORDON ..... Stenographer.

As a result of the cheese factory at Collin's Bay burning during the summer, the school was opened as a creamery on Aug. 27, and was operated as such until Jan. 3. From Jan. 3 till Mar. 26, the milk was purchased by the school, and after Mar. 26 the school was again operated as a creamery, and will continue as such during the summer months.

One result of the school opening as a creamery in August has been an improved milk supply. It has been received not only in better condition, but also more uniform in quantity and more regularly.

During the previous two sessions of the school, no short courses have been given, the long course covering January, February and March. Students who found it impossible to take the entire course, were free to come and go as they wished. It has been felt that this was not best for either the students taking the full course or those taking only part of it, and for this reason the long course was shortened during the past session, and a short course was added to the calendar.

The long course opened Jan. 3 and closed Mar. 9. Forty-nine students registered for this course. The work of this course includes lectures and practical work in cheese making, operation of cream separators, butter making, and milk testing, as well as lectures in bacteriology, chemistry, and cheese factory and creamery accounting. Examinations, both written and practical, were held at the close of this course. An effort has been made to make the school as strong as possible along practical lines.

The short course opened Mar. 16 and closed Mar. 30. Twenty-six students registered for this course. The purpose of the short course is to enable students who cannot take the long course to attend the school for a short time and get training and information along any line desired.

The instructors' course opened Mar. 31 and closed April 8. The twenty-five instructors of Eastern Ontario registered for this course. The object of calling the instructors together is to discuss the problems likely to be met in the different syndicates, and to make any changes necessary in the arrangement of the groups. As a result of this meeting there is more uniformity throughout the district.

This makes the entire registration of one hundred students, an increase of fourteen over that of last year.

G. G. PUBLOW.

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